Why Raise Our Own Freight Rates?

Loss and Damage on Shipments of Confectionery Cost the Railroads $727,484 in 1921, and in 1922 $242,889. Better Packing Will Reduce it Another 100%

Metal Strapping of Freight Containers

IN one year 40 million containers had to be repaired in transit. This fact was established by a study of less-than-carload freight made by the Freight Container Bureau, American Railway Association.

At twelve western cities 43,000 containers required recoopering during the one month of January, 1924, before they could even be started on their journey, and 6,700 containers were in such poor condition that they had to be rejected for transportation.

That faulty packing and containers are costing the railways $11,500,000 yearly is the conclusion required by a critical inspection at destination of several hundred cars of miscellaneous merchandise. Moreover, the Forest Products Laboratory of the U. S. Government estimates the economic loss to the Nation from the use of unsuitable and unscientifically designed containers at $500,000 a day.

During the present month the transportation companies, with the cooperation of the U. S. Department of Commerce are making a special effort to bring to the attention of shippers and receivers one of the things that can be done to stop some of this needless waste, viz., the metal strapping of packages.

The advantages of this form of package reinforcement are more fully explained in an article by Mr. Shields on page 43.

Strapping costs nothing because it saves more than it costs.

Government Recommends Strapping

The United States Forest Products Laboratory has made an extensive study of the strapping of boxes, which shows that metal bindings are usually of great value for securing the most serviceable container at a minimum cost.

Among the principal conclusions derived from these investigations is that the thickness of the sides, tops, and bottoms of well-balanced nailed wooden boxes possessing adequate strength and serviceability without metal bindings may be reduced 20 to 40 per cent when metal bindings are properly used, without any reduction in the strength and serviceability of the container.

The metal bindings commonly used for packing boxes are either flat metal straps or wires. Many types of flat metal straps are used, such as plain, embossed, corrugated, double-edged, and various other types that have holes or slots cut to receive nails. Wire is used as a single strand or in two or more strands twisted together.

Flat metal straps nailed around the extreme ends act somewhat as a cleat in retarding failures in the ends and reduce skewing or weaving of the box.

Straps placed some distance from the ends of the box help to distribute to various parts of the box the shocks which are otherwise locally absorbed.

Good Packing Pays

During the last two years merchandise claim payments have been reduced 65 per cent. Our investigations prove that this is largely due to the 100 per cent increased use of box-strapping, and to the study of scientific container design by shippers and manufacturers of wood and fibre boxes.

Our conviction that box-strapping is responsible for decreased damage and pilferage is confirmed by conferences with several hundred shippers whose damage and theft claims have been greatly reduced.

Over two thousand tests on strapped containers conducted by the U. S. Forest Products Laboratory, prove that box-strapping increases serviceability often several hundred per cent. Furthermore, that a stronger box may be lighter and cheaper—even after including the cost of strapping.

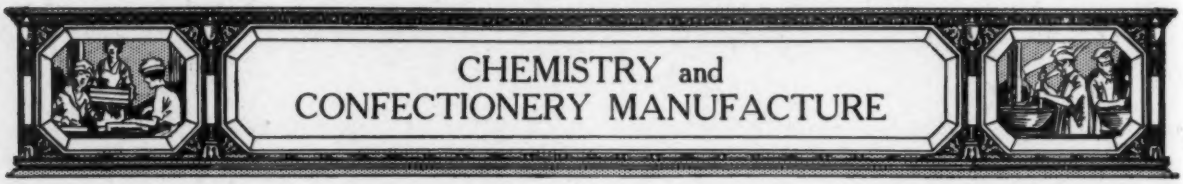
Shipper and consignee have a real interest in the carriers' study of loss and damage prevention, for the results show how simple it is to avoid damaged and pilfered shipments.

Because the remedy is so simple and cheap, consignees should feel free to request shippers to relieve them of the expense and delays of damaged shipments due to container deficiency, and should specify either stronger containers or reinforcement with some form of box-strapping.

The carriers extend their sincere appreciation to those shippers who have helped raise the standard of merchandise containers. They have assisted the carriers to move the commerce of the country with a steadily diminishing risk of damage and pilferage.

To those shippers who have not carefully considered this subject, a study of their packing problems will result in great benefits.

AMERICAN RAILWAY ASSOCIATION,
AMERICAN RAILWAY EXPRESS COMPANY,



II. Improved Methods for the Manufacture of Fondant Goods

by H. S. Paine and J. Hamilton

Carbohydrates Laboratory

Bureau of Chemistry, U. S. Department of Agriculture

The confectionery industry is fortunate in having enlisted the cooperation of the Bureau of Chemistry at Washington in doing some practical research work on vitally important phases of our manufacturing processes and problems of production. Exhaustive experiments have been carried out the past year by the Carbohydrate Laboratory by Mr. H. S. Paine, who is an expert sugar chemist, and Mr. J. Hamilton, an experienced candy maker. This makes an ideal combination for research work—a coordination of the technical and practical resources applying to our manufacturing problems.

This first chapter of the article was on the subject of Sugar Crystals versus Syrup Films. The concluding chapter will appear in next issue and will explain the new methods of manufacturing fondant goods.—Editor.

IN THE preceding installment of these articles, the composition of fondant was discussed from the standpoint that it consists of sugar crystals of miscroscopic size, surrounded and enveloped by exceedingly thin films of sirup. An explanation of the behaviour of these sirup films and sugar crystals in their relation to each other was given, with the idea that such explanation would be useful in ascertaining the causes of difficulties which arise in the manufacture of fondant candies, and would also be helpful in overcoming such difficulties. The present installment discusses additional properties of fondant, and prepares the way for an understanding of an entirely new procedure which has been devised by the writers for the manufacture of fondant goods, including chocolate coated creams, bonbons, cordialized fruit centers, etc.

Plasticity of Fondant

From the standpoint of commercial quality value in candy, the plasticity of fondant is one of the most important of its many interesting physical and chemical properties. The plasticity of fondant is primarily influenced by the viscosity of the sirup film, by the size of the sugar crystals, and by the proportionate amounts of sugar crystals and sirup film of which the fondant is composed. It will be seen from the foregoing that the microscopic sugar crystals and sirup film produce opposite effects in determining the consistency of fondant. The sugar crystals tend to cause stiffness and the sirup films tend to produce softness and fluidity. Since plasticity is such an important factor, one cannot too thoroughly understand the various ways in which it may be controlled, for such information has real, practical value in manufacturing operations. As previously explained, fondant is somewhat similar to putty in that each consists of extremely small particles of a solid surrounded and enveloped by thin liquid films. The microscopic sugar crystals or fondant correspond to the whiting of putty, and the linseed oil films of the latter correspond to the sirup films of fondant. There is an important difference, however, in that the solid particles (sugar crystals) are soluble in liquid portion (sirup film) of the fondants, whereas the corresponding relation does not hold true in the case of putty. This fact makes possible a much greater change in the consistency of fondant with variation in temperature than is the case with other plastic materials in which the solid portion is not soluble in the liquid portion.

When the temperature is raised the fondant becomes softer for a number of reasons, among which the following are of most importance: (1) The sirup films become less viscous; (2)

some of the sugar crystals dissolve in the sirup films, thereby increasing the ratio of the latter to the former. If, after being heated to a high temperature, the fondant is subsequently cooled, there is a possibility that it may become granular or "grainy" in consistency, although this does not necessarily occur. Such a change in character is due to the fact that at the higher temperature the sirup films, by dissolving additional sugar crystals, become saturated at this higher temperature and are then supersaturated at the lower temperature to which the fondants is subsequently cooled, i. e., the excess of sugar dissolved at the higher temperature separates out at the lower temperature in the form of crystals. If sufficient care is not taken in remelting fondant, the crystals which separate out as the temperature drops may be of excessive size, and, therefore, perceptible to the tongue, thus causing coarse or granular consistency. This effect may also result from crystals forming in clusters.

"Grainy" Fondant

The danger of causing "grainy" fondant, due to considerable variation in temperature, is greatest with fondants made from sirups boiled to relatively low temperatures; this is due to the fact that, as more water is present, a greater amount of sugar crystals can be dissolved and thus a greater amount of sugar transferred from the solid to the liquid portion, and vice versa. Of course, if the amount of sugar crystals which separates out with drop in temeprature is sufficiently small in comparison with the total amount of sugar crystals present in the fondant, the effect on consistency may be negligible, even though the crystals which separate are of excessive size. Keeping in mind that fondant consists of both a solid and a liquid portion, the fact that sugar is the fondant may be transferred in either direction from the liquid to the solid portion or vice versa, is a matter of great practical importance, and means that the fondant must be handled more carefully than a plastic substance such as putty in which such transfer is not possible.

Elimination of Water

The loss of water from the fondant under varying conditions is another subject which has important possibilities from a practical standpoint. This water is, of course, present in the fondant in the form of sirup, but may be eliminated therefrom by evaporation just as in the case of any larger volume of sirup which is exposed to the air. When fondant made from low cooked sirup is remelted and poured into starch molds, the elimination of a certain amount of water from the fondants pieces is necessary in order that they may become sufficiently firm for handling. Part of this moisture evaporates into the air, but most of it is absorbed by the starch. In other words, the mere cooling of such a fondant is not sufficient to produce firmness. Since rubber absorbs practically no moisture, this explains why pieces of fondant made from low cooked sirup do not become sufficiently firm in rubber molds within a reasonable length of time. The elimination of water from fondant in the manner above discussed decreases the amount of sirup films and the concentration in this manner of the sugar dissolved in the sirup films finally causes separation of sugar crystals. Since fondant becomes firmer as the proportion of sirup films to sugar crystals decreases, the foregoing explains the firmer consistency which results in the case discussed.

The water absorbed by the starch is eliminated for the most part from the more superficial portions of the fondant pieces, thereby producing a "crust." In an experiment in which fondant was prepared by boiling (to 240° F.) a sirup containing 4 parts sugar to 1 part corn syrup, by weight, then remelting at 140° F., and allowing to remain in starch 24 hours, there was an absolute difference of as much as 3 per cent water in the exterior "crust" and the interior of the individual fondant pieces, the maximum per cent of water in the fondants being 9.9 per cent.

"Ripening or Sweating"

The surface drying of fondant, either when exposed to air or when remelted and poured in starch, explains in large part the subsequent "ripening" or "sweating" of fondant. This ripening consists in a redistribution and equalization of the water content in the fondant pieces by diffusion and capillary action. For the same reason, a piece of fondant which has become rather dry on the surface as a result of exposure to air of relatively low humidity, assumes a homogenous moist appearance when worked or kneaded with the fingers. In equalizing the moisture contents of the surface crust and the interior of the fondant piece, the fondant exhibits capillary action which may be compared to that of a blotter; that is, there is a certain degree of capillarity due to spaces existing between the microscopic sugar crystals. Diffusion plays an important part. The following experiment will serve as a good illustration of what is meant by diffusion. If a pint of a heavy sirup be placed in a vessel and a pint of a lighter sirup be carefully poured on top of the heavier sirup without mixing, and the two layers are allowed to stand, they will, after a certain period, be found to be completely mixed and homogenous, in spite of the fact that the lighter sirup is on top.

When water is eliminated from the exterior "crust" of a fondant piece, as in the example above mentioned, less water remains in the sirup films of the "crust" and these sirup films become of higher density or thicker consistency just as in the case of a larger volume of sirup from which water is removed by boiling or by evaporation. The sirup films of higher density in the exterior "crust" are in direct contact with the sirup films of lower density in the in-

terior of the fondant pieces and all these films finally become homogenous and of the same density or consistency in the same manner as the two layers of sirup in the example above given. Ripening or equalization of moisture content thus occurs fairly slowly by diffusion whereas the same result can be demonstrated quickly by working or kneading the fondant with the fingers. In the latter case the sirup films of varying density or consistency are quickly brought into contact and mixed to uniform density during manipulation of the fondant. Excess of sugar present in the sirup films as a result of elimination of water will finally separate out in the form of crystals. Since ripening consists largely in the equalization of the water content and consistency or density of the sirup films, and exposure to air causes formation of a crust by evaporation of water, fondant ripens more rapidly when kept covered or when only a small proportion of its total surface is exposed to the air. For this reason ripening proceeds more rapidly when fondant is coated with chocolate. Changes in the manner in which the sugar crystals are packed together in the fondant, and coincident variation in the thickness and continuity of the sirup films, may also play a part in ripening.

Temperature Range

The range of temperature within which fondant is sufficiently plastic or fluid to be poured is, as is well known, a very important factor in candy making, and the molding of fondant is in part dependent on the fact that the plasticity of the fondant varies with the temperature. The temperature range within which a "short" fondant, such as is used for coating bonbons, is sufficiently fluid to flow is higher than that of other types of fondant. This is because a short fondant is produced from sirup containing a higher proportion of sugar, and consequently contains a greater amount of sugar crystals and smaller amount of sirup films than ordinary fondants. Since the flow of a fondant depends upon the presence of a certain minimum amount of sirup films in proportion to sugar crystals, it is necessary with most fondants to greatly increase the amount of sirup films at the expense of the sugar crystals in order to render the fondant sufficiently fluid. This is accomplished by raising the temperature and thereby dissolving a certain amount of sugar crystals in the sirup films. Since a "short" fondant contains an unusually small amount of sirup films, it is necessary to dissolve an increased proportion of sugar crystals and a higher temperature is therefore required. Conversely, as the temperature range for the plastic flow of a short fondant is higher than that for ordinary fondant, a short fondant does not need to be cooled to as low a temperature in order to "set."

On the other hand, when it is desired to produce a fondant which is sufficiently fluid to flow at a low temperature range, it is necessary to decrease the proportion of sugar crystals to sirup films. Since corn syrup does not crystallize in the fondant as cane sugar does, all of the corn syrup added is present in the sirup films; consequently the proportion of sirup films to crystals may be increased by increasing the proportion of corn syrup in the batch. This result may also be accomplished by adding invert sugar or by reducing the cooking temperature and thereby increasing the water content. The proportion of sirup films and the degree of fluidity of the fondant at a given temperature may, therefore, be increased in any one of the three ways mentioned, although the texture of fondants prepared in these three ways will, of course, not be identical. The foregoing principles are observed in the production of fondant which is sufficiently fluid for use in automatic depositing machines.

Why Centers Dry Out

Even when a coating, such as chocolate, is used, fondant centers eventually dry out. Chocolate coating, owing to its content of cocoa fat and the emulsified condition of the fat, greatly retards evaporation of water from the fondant, and the greater the fat content, and the more perfect the fat emulsion, the greater is this retarding action. The very gradual evaporation of water from the fondant through the chocolate coating first causes supersaturation of the sirup films; that is, owing to elimination of part of the water, the remaining water holds in solution more sugar than can be retained and consequently this excess amount of sugar gradually crystallizes from the sirup film and is deposited in the form of crystals which vary in size according to the temperature and rate of crystallization. If these crystals are sufficiently large to be detected by the tongue, the fondant tends to become coarse and granular as a result of this gradual drying out. In addition, owing to loss of water and decrease in the amount of sirup films in proportion to sugar crystals, it becomes stiffer and less plastic.

If it were now desired to remove this fondant from the chocolate coating and remelt it, a considerably higher temperature would be required in order to render it sufficiently plastic to flow. The result of this gradual drying-out process is to continuously reduce the proportion of sirup films to sugar crystals until finally the sirup films practically disappear and the fondant consists almost exclusively of sugar crystals. Its properties have now entirely changed. It is no longer soft or plastic, but is quite hard and brittle. Fondant when first prepared may contain as much as 11 or 12 per cent water, and when dried out to the point just described may contain as little as 1 per cent or less. In addition to the influence of the character and thickness of the chocolate coating, the rate of evaporation of moisture from the fondant center is, of course, also controlled by the humidity of the atmosphere. The foregong should sufficiently emphasize the important part played by sirup films in the fondant.

What Makes Candy "White" or Light

Fondant contains a considerable amount of very small air bubbles, which are not directly apparent to the eye and which have been incorporated during the creaming of the fondant. These microscopic air bubbles play a certain part in determining the degree of whiteness of the fondant. It has been stated as a result of scientific investigation that there is no white pigment in any white flowers or in white hair. The white color of the lily is due to the presence of innumerable minute air bubbles, and the same is true of white hair. The lightening in color of taffy when pulled is also largely due to incorporation of a multitude of minute air bubbles during pulling. Somewhat the same effect is produced by the rather considerable proportion of minute air bubbles in fondant. This largely explains the effect of a colloidal substance such as whipped egg albumen in increasing the whiteness of fondant when added thereto. The colloidal albumen not only introduces a certain proportion of exceedingly small air bubbles, but also prevents the minute air bubbles already present in the fondant from aggregating or collecting to form large bubbles; the degree of whiteness tends to decrease as the air bubbles become larger.

In the next installment of this article there will be discussed in detail the new methods for manufacturing fondant types of candy already referred to, and it is hoped that the discussion contained in this and the preceding installment will serve to fully explain the exact character of these methods.

Joseph Shapiro Buys Cosner Candy Co.

Joseph Shapiro, formerly part owner of the Savage Candy Company, Denver, Colorado, who sold his interest in that concern last January, has purchased the machinery and plant equipment of the Cosner Candy Company, 1534 Wazee street, for $12,000, and announced Friday plans for the expenditure of $75,000 in equipping a new candy factory.

The new factory will be located at Twentieth and Arapahoe streets. The new factory will be operation by July 15, Shapiro said.

The new candy company will continue to use the name of the Cosner company. The Cosner company was incorporated by Shapiro with the secretary of state Wednesday, with a capitalization of $50,000.

With a staff of thirty employes, the Crisp Packing Company, manufacturers of candy, has reopened under new management, it is announced. The company features the "Crispo Packo" line. J. J. and T. W. Hanrahan are operating the new concern, effecting a complete reorganization.

The Stewart-Earl candy factory, Hialeah, Fla., have begun operations. The company manufactures chocolates and specialties.

The Sanitary Food Manufacturing Co., St. Paul, are manufacturing corn cob suckers for the Picardy Candy Co., Ltd., Winnipeg, Canada. They are to have national distribution.

The Davis Candy Co. of Springfield, Mo., have begun the erection of a new plant. The building will represent an outlay of approximately $40,000 and will be 100x54 feet and will be two stories and full basement. The second floor will be devoted entirely to the manufacturing department. J. F. Davis is the sole owner of this company.

C. G. Sander, who has been treasurer and general manager of the Cox Confectionery Co., East Boston, has severed his connections with the firm. Mr. Sander expects to start his own company within the next few months.

The George W. Adams Co., Inc., Watertown, N. Y., sold their equipment and machinery to the Kamargo Confectionery Company of that city. W. H. B. Smith, who is president of the George W. Adams Co., is also president of the Kamargo Confectionery Co.

At a meeting of the boards of directors of the American Caramel Company and the R. E. Rodda Candy Company, held in Philadelphia, Oscar H. Heckert and William D. Himes were elected directors in both companies to fill vacancies caused by resignations of Clinton R. Weeden and Richard M. Bowen of Providence, R. I. The other directors of the companies are Ellis S. Lewis of York; W. J. Chapman and H. R. Jones of Baltimore; Henry Salomon of Province and W. F. Dunspaugh of New York. Mr. Lewis is also president and Mr. Himes secretary and treasurer of these companies which own and operate plants in York and Lancaster.

Brown Cracker & Candy Co., Jefferson & Caruth streets, Dallas, Texas, have their new factory nearly completed. The total floor space will be 250,000 square feet. The factory is to be equipped with added machinery and an additional force of 300 will be added to the payroll, it is announced.

Curtis-Ireland Candy Co., St. Louis, Mo., have moved to larger quarters at 501-3-5 North Main street in that city.

Henry Maillard, Inc., New York City, has bought a block front on east side of William street, Long Island City. They have not announced what their plans are for this property.

The Crisp Packing Company, Petersburg, Virginia, has reopened their factory under new management. They manufacture peanut candy. J. J. and T. W. Hanrahan are the new owners of the concern.

Roger W. Babson says: "Business conditions are not determined by bank clearings, foreign trade, immigration, railroad tonnage, etc. These are indicators. The changes in business conditions are caused by the changes in the moral fibre of the people. The difficulty with labor is a moral question and not an industrial one."

"The world that we must seek is a world in which the creative spirit is alive, in which life is an adventure full of joy and hope, based rather upon the impulse to construct than upon the desire to retain what we possess or to seize what is possessed by others. . . . Such a world is possible. It waits only for men to wish to create it."

III. Desk Tests for Shelled Nuts

The third of a short series of articles on "Fifty Desk Tests for Raw Materials."

by Albert Adams Lund

Mr. Lund is purchasing agent with one of the foremost manufacturing confectioners in America. This series will cover the various phases of the everyday interests and problems of the buyer of candy factory supplies. Comments and open discussions from other buyers are invited, as well as suggestions of topics which would be of special timely interest to any of our subscribers—Editor.

Do You Know: *What causes the charred effect which you often see near the bridge on the under-surface of walnuts?*

Do You Know: *What other visible evidences of insect infection precede worm-cuts?*

Do You Know: *Where to look for the first signs of worm-cut on almonds, on walnuts, and on filberts? What indicates the presence of weevils?*

Do You Know: *Why recleaning delays but does not prevent the development of animal matter?*

Even if you think you know the answers to these questions it will be worth your while to check your knowledge with Mr. Lund's article.

(*Continued from May Issue.*)

Examining for Insect Infection

HAT other single factor is more productive of financial losses, lawsuits and ruined reputations than the armies of insects transported around the world in raw materials? Given the favorable propagating conditions which prevail either in the warehouse, the factory, or in the home, and the presence of one egg-infected nut may foredoom the quality of our finished product and proclaim to the customer the impotency of modern protective measures.

That the association is not pleasant may explain the widespread ignorance of the conditions which accompany the development of the infection. Few shelled nut handlers and fewer candy manufacturers are even familiar with the nature of the infection, much less do they know just where to look for its physical evidences. The plant manager of a widely-known shelling plant inquired not long ago if there was not some powder or insecticide which he could use to spread on the floor to keep the worms from crawling from barrel to barrel and ruining his goods! He had not know that it was the moths flying overhead which required his attention, but seemed quite willing to commence his education all over again along the lines of his newly-acquired knowledge.

As is true of most subjects on which little has been known, we are being constantly showered with gratuitous advice as to how we may kill off or prevent the recurrence of animal matter in shelled nutmeats. Most of these suggestions are worth just exactly what they cost. Of these, one of the most frequent is to put the packages in "meat cold storage" until the worms or other insects have been frozen to death! The goods are then removed from storage and the carcasses and web removed by the usual recleaning process. Now, in the first place, it is a violation of the health laws of many, if not all, of the states, for an individual to place in public storage or for a warehouse to receive for storage purposes, food which is in this unclean and unhealthful condition. Secondly, the method does not accomplish what its advocates claim for it. Subject the treated nuts to the usual favorable conditions, and the thousands of microscopic eggs, unaffected by the extreme cold of storage, will bring forth their kind and thus renew the destructive cycle. Nor can heat alone be employed to bring about the destruction of these eggs without a careful and scientific co-ordination with other factors.

From the buyer's point of view, the best way to keep out of trouble is the simplest way. Buy on some specification such as "free from insect infection" or "free from animal matter" and when the lot comes in go over it with a fine

tooth comb and reject cases which give visual evidence of an infection. This should be done even if the lot is to be subsequently treated; a dead worm or a worm hole still looks unappetizing to the customer. Although the portion which has passed the visual inspection may be similarly laden with eggs, it is obviously less difficult to keep than a lot in which the insect life has already reached an advanced or adult stage. Furthermore, such a lot is less likely to infect nearby lots in storage.

There are certain physical evidences which will show up in a hand-drawn sample even though the lot has been recleaned, and these, studied in conjunction with any particles of web or slightly worm-cut kernels which may have escaped the mechanical brushes or hand-pickers, form the basis of a reasonably accurate determination of the stage to which the infection has progressed.

To Determine the Presence and Character of Animal Matter in Nutmeats

Draw a fresh sample from different sections of the lot to be tested. Note the soundness and general condition of the sample and go over the kernels carefully as suggested under the following heads:

Eggs

Tiny gummy masses of brown or black will occasionally be found on the surfaces of kernels. These are the genesis. Each exudation consists of an enormous number of eggs, the individual members of which are visible only through a microscope.

Thread (or Silk)

The next signs of animal life to be seen with the naked eye are the fine hair lines of web (the silk of the moth-worm), which are trailed by the worm from nut to nut. These single strands must not be confused with the complicated texture of which they are a part at a later stage.

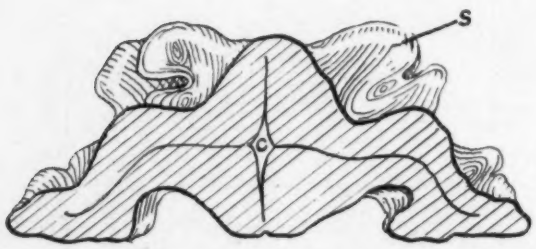
Excreta

Tiny, loose, brown or black, or cream-colored particles (usually caught in the web and mistaken for eggs) occur wherever the worm has fed. These particles are not always accompanied by worm-cuts since the worm may have moved on to another nut before fracturing the surface to an extent visible to the eye.

Saliva Discolorations

Generally at these feeding places (and particularly on pistachios and walnuts) there will be found a pronounced brownish or black discoloration caused by the action of the worm's

WALNUT



The shrinking cavity in nut meats—a useful index to their age, curing or drying.

saliva upon the pigment or coloring matter of the nut. Examined closely or with the aid of a glass, these sections will be seen to have been cut, although, as is apt to be the case with a high-priced nutmeat, all other visible evidences of the infected condition have been removed. The discolorations are common on the under-surfaces of walnuts near the shrinkage cavity.

Worm Cuts

Actual worm cuts are unmistakable only in the sense that they are easy to identify once they have been found; but except in advanced stages, where the physical damage is considerable, they may remain unrecognized or undiscovered through half a dozen superficial examinations, not to mention recleanings. The worm will occasionally eat along the surface of the kernels. Nuts so scarred rarely get by the picker, however, and should hardly be looked for in recleaned lots. Ordinarily the worm will avoid eating much of the bitter-tasting skins by puncturing the surface with a hole just large enough to permit it to enter the kernel; or it will select as the point of its attack some portion of the kernel from which the skin is already absent.

Walnuts and pecans should be examined at the bridge, which forms the connecting link between the two halves. Here you will find the characteristic discoloration of the surrounding skin, with jagged worm cuts extending down into the shrinkage cavity and around the skinless surface of the broken area.

Almonds, pistachios, cashew-nuts, and pignolias are usually attacked at the small end or tip of the kernel. From this point the worms bore straight in and eat along the axis of the kernel, between the halves. These small holes bored at the exact tips are quite inconspicuous and consequently often overlooked in the regular examination. A good way to tell whether a pistachio nut has been eaten away inside is to roll the kernel between the fingers with a slight pressure to see if the skin collapses.

Web

This tangled skein of grayish larva-silk is the most typical, but likewise the most readily removed evidence of insect infection. Tiny streamers of web emerge from the small ends of almonds, pistachio-nuts and pignolias, those of the latter being distinctly characteristic because of the difficulty of recleaning a nut which is so small. The presence of these streamers signifies an advance to the more dangerous or pupa stage, even though the cocoons and pupa cases have been removed.

Weevils in Pignolias

Pignolias are frequently subject to the attacks of weevils. These insects leave no web, but reduce the kernels to a fine powder, which, because of the oily character of the nut, sticks to the surface, giving the kernels a dusty and worm cut appearance.

Worms in Filberts

Unlike the moth-worm, which infests walnuts and almonds, filbert worms are the larvae of beetles or weevils. These are very small worms which are almost always found in the heart of the kernel. In cutting filberts for determination of mould, the percentage of wormy meats may be readily ascertained.

That any infection of nutmeats may be localized would seem highly probable. This condition enables and even encourages the repicking of samples. Therefore, unless the sampling is extremely thorough and dependable, the buyer should not be completely satisfied until a supplementary examination of the packages has shown the goods to be free from animal matter. The following suggestions should assist materially in this examination.

Supplementary Examination of Packages

Having finished eating, the worm instinctively crawls up and to the light, here to begin the spinning of the cocoon in which it undergoes its final transformation. It is this crawling to the light (together with the fact that case goods are seldom subjected to the shaking up which bag goods receive), which accounts for the presence of this most striking bit of animal matter at the tops of cases, or near cracks or crevices. In fact, it is not unusual to find these cocoons between the paper liner and the wood. In bag goods they are apt to be found most anywhere.

As you open a case, look for these formations in all the corners and interior angles. Wherever possible for it to do so, the worm crawls into a corner in order to minimize the amount of wall surface which it will be required to cover in spinning the cocoon. For the same reason the cocoon is often spun in the crevices of a walnut. Since even recleaned nuts are ordinarily dumped back into original cases in whose corners the cocoons are still clinging, the presence of these may be regarded as an indication of the serious stage to which the infection has progressed.

Weevils, because of their tendency to fall through the package in handling, will usually be found on the side of the case which has most

Suggestions for Card Record of Shelled Nuts.

KIND: ALMONDS. VARIETY: AETNA. GRADE: MED.

Mark	Crop	Count	Uniformity	Flavor	Color of Meats	% Under Grade		% Defective			Remarks
						Pieces	Twins and Shrivels	Bitters	Mould	Worm Cut	
AA	1922	30.5	O. K.	Strong	30% dark	3	2	4	...	7	Rejected

KIND: WALNUTS. VARIETY: BORDEAUX. GRADE.

Mark	Crop	Count	Uniformity	Flavor	Color of Meats	% Under Grade		% Defective			Remarks
						Pieces	Shrivels	Dk. Skin and Arleq.	Mould	Worm Cut	
AA	1923	...	23% sm.	Sweet	White	8	...	...	...	...	Accepted

(Appropriate heads such as curing, etc. to be inserted where necessary on charts for other nutmeats.)

recently been bottom. They must be watched for carefully as the case is emptied.

It takes but a moment to complete the story of the Indian meal moth. Each cocoon releases a self-imprisoned moth. It lives only a few days and eats nothing while it lives. But in that brief interval the female moth is courted, several hundred of her eggs are fertilized, and she commences to lay them here and there on any material which will furnish a proper food supply for her young larvae when they hatch out. This done, her sole mission is fulfilled. The innocent-looking cocoon has spelled the ruin of perhaps several hundred dollars worth of your goods.

Need of a Common Language of Understanding

In the language of the trade there are only two stages of insect infection to which nutmeats are subject. A lot is either "webby" or it is "worm-cut." If it is webby, they believe that it is only necessary that it be brushed in order to restore it to a perfectly sound condition; if it is worm-cut, that the damaged kernels may be removed by hand-picking after the lot has been brushed. The majority of shellers and importers sincerely believe that after they have done this, the lot is as sound and free of insect infection as the day it was harvested. To them the moth has no special significance. Yet without her there could be no worms and no web.

Methods of Determining Age or Crop Year

Every year there is a substantial carry-over of old crop nutmeats. Now either these nuts must be sold for what they are, and consequently at a price concession, or they must be masqueraded as new crop kernels, in their original packages or in mixtures with fresh lots of the same material. The latter alternative is often the shipper's only opportunity to come out "whole" on the transaction so it is not surprising that the bulk of the carry-over is disposed of in this fashion. It is evident that we must find some means of protecting ourselves against the flagrant abuses of this practice.

It is often difficult if not impossible to tell whether a lot of nuts is naturally or "prematurely" old. Unlike the tree trunk which adds a ring to its circumference for every ear of its growth, the natural ageing of nutmeats is not accompanied by any change (except sprouting, in pignolias), which might not also result from some purely artificial condition. The salesman's type soon ceases to be as sweet, as bright or as fresh as the lot of which it was a part while the use of vacuum-sealed tins in packing pecans and cashew-nuts, and the employment of low-temperature air-conditioned storage are familiar examples of means by which the ageing process may be delayed. It is only by combining the results of such tests as are enumerated in this and the preceding articles of this series that we are enabled to deduce the natural age of the nuts we buy.

Following are the physical manifestations of age in nutmeats:

A. Darkening of the skins.
B. Discoloration of the meats.
C. Drying out, enlargement of shrinkage cavities, etc.
D. Loss of sweetness or characteristic flavor.
E. Stage of insect infection.

F. Sprouting, or other signs of organic deterioration.

Let us consider them in the order mentioned.

Darkening of Skins

Under normal conditions, the skin of nutmeats become darker in proportion to their age. This action is accomplished by the air's slow oxidation of the vegetable pigments in the skin (the reverse of the reduction process employed in bleaching). Were we to exclude the air, the natural light colors of the kernels would in large measure be retained. An instance of this is the almond, whose impervious shell virtually forms a hermetically-sealed chamber for the kernel, preserving both the natural color and sweetness of the nut for an indefinite period.

The normally slow process of oxidation is greatly hastened by the presence of either light or heat, the former, a natural catalyst. Conversely, the action is retarded when the goods are protected from these factors in cold storage.

The premature darkening of the skins may also be due to certain accidental causes such as the chemical reaction resulting from exposure to gases. Most common of these is the bursting or leaking of an ammonia pipe in cold storage. Ordinarily the exposure to the gas is of short duration at a high degree of concentration, in which event the ear-marks of the accident are readily distinguishable from natural darkening. The only nuts to become darkened or blackened are those which are near cracks or crevices in the cases. A long exposure to a weak concentration of the gas, however, would affect simultaneously and darken all parts of the lot alike.

New crop nuts unduly exposed to these conditions may conceivably be just as dark as nuts a year old. Therefore, although the darkening of the skin is one of the most direct evidences of the advancing age of the kernels, there is need of other testimony to support the charge that a lot of meats is of a previous crop.

Discoloration of the Meats

Cut the kernels in half so as to expose the meats in cross-section. As the nuts age, the oil has a tendency to separate out, causing the meat to become translucent. The predominance of a large number of "black meats" is silent witness to the organic deterioration which is taking place within the nut. The higher the natural oil content of the nut, the more pronounced will be this tendency toward black meats. Pistachios lose their first vivid greenness, becoming pale green and finally take on a brownish tinge. In walnuts, an intense yellowish discoloration concentrates about the center of the kernel. These are almost certain indications of old age.

Drying Out

As the nuts become older, they dry out. This natural shrinkage may be advanced or retarded by the conditions of heat and humidity to which they are subjected in storage; likewise by such purely artificial means as "forced" or oven curing. The condition of dryness is nevertheless an important factor in determining the age of nuts.

Break a few kernels between the fingers. New nuts will be pliable; old nuts, brittle.

On walnuts, pecans or filberts, try to rub or scrape off portions of the skin with the tips of the fingers or with the finger-nail. On fresh kernels, the skin will adhere tightly; on old nuts it will be found to be dry and will peel off very readily.

Pistachios a season old will not appear so full meated, their surfaces having taken on a few additional wrinkles during the shrinking process. Surface wrinkles on the filbert become more pronounced, resembling somewhat the wavy rings of the tree.

Coupled with these the gradual enlargement of the so-called shrinkage cavity and you have a fairly dependable measure of the drying out and consequently, ageing process. These cavities appear to best advantage when the kernels are cut in cross section, as below:

PECAN

In filberts, the hard brown crust which sometimes surrounds the cavity, is further evidence of the time elapsed during the gradual oxidation of the side-walls by the indrawn air.

Loss of Flavor

Hold a handful of the kernels to the nose and smell them. As the nuts become old, the tendency is for them to become strong or rancid, a condition which is often perceived more quickly by odor than by taste. (An extreme instance is the pignolia.) Then taste a few of the kernels. Age makes the skins more bitter; meats like the almond, the brazil or the pistachio become flat-tasting; the pecan and the walnut become sharp, the latter gradually turning to rancidity. Less and less of the characteristic flavor of the nut remains.

To the sensitive palate, flavor is the chief age-barometer of nutmeats. Although susceptible alike to heat, gases, and the odors of extraneous materials in nearby storage, flavor furnishes the final yes or no to the quality or age of every sample submitted. Whether the changes are due to age alone or in combination with the influences mentioned is scarcely of moment since their effect on the quality is much the same.

The Stage of Insect Infection

The presence of animal matter in a lot is due to one of two causes. Either the nuts are old or they have been kept in a warm place. In any case, since a certain minimum time is required for the development of the infection, it is pos-

sible to deduce, particularly at the beginning of the season, whether the nuts are of old or of new crop.

Sprouting

The pignolia, probably because of its high moisture content, is the only nut we use which will sprout at the end of its season without having to be planted or soaked in water.

Break the kernels in half with the fingers. In the center you will find the leaf which is the beginning of the pignolia tree. When partially developed, it is somewhat harder than the surrounding meat and will protrude from one side of the break. In color it is white to greenish. If the nut is new, this leaf will be small, white and inconspicuously located at one end along the main axis of the kernel. The larger and more perfectly-formed the leaf, the older the nut.

The indictment of a sprouted pignolia cannot be gainsaid. The sprouting only takes place after the nut is a season old.

Unfortunately, the factor which enable us to determine the age of other nuts are not as clearly evidenced as the shoot of the pignolia; yet, by combining the various aspects, principally of color, flavor and dryness, we may tell with a fair degree of certainty, the comparative freshness of the lots on which we are called upon to pass judgment.

WHY WORKMAN REPRESENTATION SOMETIME FAILS

There is one outstanding reason why "industrial democracy" has been strikingly successful in some plants, and a disastrous failure in others. The failures in some plants have been due to a combination of causes, but the all but universal reason is—lack of good faith.

A usual part of such systems has been the payment to the men of an economy bonus—a certain share of the savings that they have made in reducing labor and expense cost, and in reducing the waste of materials.

In most cases where these bonuses accurately reflect the savings, industrial democracy has worked.

But there were many plants that were unwilling to do the rather simple accounting necessary to determine the bonus. In several cases I found that the management paid out what it felt it could afford based on current profits. In others, the management would say among themselves, "How little will those highbinders be satisfied with?" While the payments presumably rewarded economies, actually they had no relation to reduced costs.

It did not take the workers many months to find that out. They then either grieved their employers by losing interest in the representation system, or angered them by demanding that a definite increase of wages take the place of a gratuity.

There is not a doubt that a lot of well intentioned manufacturers have suffered unjustly at the hands of labor. But there is also no doubt that some have gotten exactly what was coming to them. Good faith is fundamental to a successful labor policy.—By William R. Basset.

Chinese Market for American Confectionery

The Chinese market for a selected line of confectionery and candy offers excellent opportunities to American manufacturers and exporters, according to the Assistant Trade Commissioner, Shanghai, in a recent report to the Department of Commerce. Transportation and climatic conditions, together with the demands of the market, call for types of candy and styles of packages not commonly placed on the China market by American manufacturers. The two most popular and widely sold confections are tin foil wrapped solid pieces of milk and nut chocolate in one-half and one (½ and 1) pound tins and hard candies in glass jars. A weakness of the glass jar trade is the ease with which candies of native manufacture may be sold in packages similar to the imported goods, a thing which is almost impossible in the chocolate trade.

While the Chinese market has very evident limitations, these are in a great measure augmented by a lack of understanding of Chinese market characteristics. China is a country of extremely low per capita purchasing power and one and two pound packages of candy, retailing at high prices can only appeal to the comparatively insignificant number of resident Americans and Europeans, while small packages retailing at from 15 to 50 cents in silver, adapted to the ideas of the Chinese buying public, could be sold in large quantities. Overstocking should be avoided and the desired sales volume secured by distributing smaller lots through a widely selected list of distributing points, more or less under supervision, rather than by loading a large stock with one or two dealers. One of the outstanding characteristics in Chinese markets is the custom of buying by brands and trademarks well known through long established familiarity and reputation. Low cost units in attractive packages with wide small lot distribution and maintenance of quality will produce startling results in the Chinese market, justifying the necessity of slightly larger initial marketing expense.

American confectionery products are advertised to only the slightest extent in China, while one of the most important factors in the sales of candy from other countries is that they are widely advertised all over China. It is believed that a consistent advertising campaign would bring good results.

Know the Success Family

The father of Success is Work.

The mother of Success is Ambition.

The oldest son is Common Sense.

Some of the other boys are: Perseverance, Honesty, Thoroughness, Foresight, Enthusiasm and Co-operation.

The oldest d aughter is Character.

Some of the other girls are: Cheerfulness, Loyalty, Courtesy, Care, Economy, Sincerity and Harmony.

The baby is Opportunity.

Get well acquainted with the old man and you will be able to get along pretty well with all the rest of the family.

Selecting Assistants

by Ralph G. Wells

Member Committee on Industrial and Commercial Planning, Boston Chamber of Commerce.
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Formerly President National Association of Employment Managers.

Exclusively for The Manufacturing Confectioner

ACCORDING to several candy executives, there is no more important problem for the moderate-sized plant than the choosing of those employes who are to become a part of the management and supervisory organization. The same idea was also emphasized recently by a banker, who is intimately acquainted with the candy industry, when he said in regard to the moderate-sized plant: "Too many confectionery plants are one-man affairs, and the proprietor does not know how to develop an organization which will be able to carry on business." From the financial standpoint, banks would rather not be tied up too heavily with a firm whose success is dependent upon a single individual. They prefer those where there is a well trained organization to carry on in case the proprietor becomes incapacitated.

Another executive expressed a similar opinion in discussing the development of an organization, when he said: "This may not be the most important problem, but it is the one most frequently neglected. For some reason or other, the proprietors of the smaller plants do not seem to pay much attention to the careful selection and development of their assistants and those who hold minor office and supervisory positions."

In larger organizations the training and development of executive material goes on more or less automatically. Many new employes are taken on and tried out in minor positions during the course of a year almost without conscious effort on the part of the organization. The better ones are retained and gradually developed by transfer from one kind of work to another, eventually being promoted to positions of more and more responsibility until they become valuable assets to the firm. This process at the same time eliminates those of lesser capacity. Furthermore, there is a discipline and stimulus to the large organization that keeps men moving just as if they were marching in a parade. They must keep in step; they must march on, or drop out and be numbered among the stragglers.

This does not occur in the smaller organization unless the chief executive consciously makes it a definite part of his program to see that men of the right calibre and of sufficient potentiality are selected, and that they are given such training as will develop them into real assistants who can shoulder responsibility and accomplish things on their own initiative without supervision.

As indicated in a previous article, "The chief problem of the proprietor of the moderate-sized plant is to conserve his own time and to gather about him those who can gradually relieve him of certain management and administrative details, so that he himself can grow with his business, have more and more time to build for the future."

One man of long experience in picking and developing men for sales and minor executive positions made several suggestions regarding the selection of employes for permanent positions. These suggestions, together with others, are summarized below:†

†(Ed. Note: The reader is also referred to the article in the May, 1924, issue of "THE MANUFACTURING CONFECTIONER" on "Organizing to Save Time"; the one on "Some Organization and Personnel Problems" in the October, 1923, and "Building an Effective Working Force" in the August, 1923, issues of this magazine, as these discuss other important phases of the development of an adequate and effective management organization).

Character, Knowledge, and Experience Come First

Naturally, in selecting salaried employes who may become familiar with the more intimate details of business, the proprietor will wish to satisfy himself regarding the character, business training, experience, and personal ability of the applicant. His general education and business knowledge are also important. Experience has shown that those salaried employes who have the best mental equipment and training develop the most rapidly. There is a popular impression in some quarters that college training is of little value in business. Nevertheless, statistics show that in the long run college men develop better and go further than those who have not had the same mental drill and training.

Experience is a valuable asset, provided it has been gained in the right environment, but several employers intimated they would rather train green men than those whose experience had not been with a good firm.

Insist on Good Health

Select only employes with good health, who evidently have plenty of energy, enthusiasm, and stamina. A growing business makes so many demands, and there are so many discouragements to be faced that no executive can afford to saddle himself with employes who must be prodded to keep their work up and whose

lack of interest and enthusiasm will constitute a drag upon his own energy. One self-starter who can accomplish things on his own initiative without constant supervision is worth ten of the ordinary kind who hang back until someone else supplies the motive power. In such a highly competitive field as the candy industry the executive needs assistants who can bear the brunt of the struggle for business and hit the line hard and fast day in and day out.

Avoid the listless, tired individual who does not seem much interested in anything, as well as the chronic dyspeptic and others whose ailments will interfere with their effectiveness. Such people neglect their work, cast a discouraging blanket over those around them, become dissatisfied and develop into chronic grouches.

Even after the employe becomes a permanent member of the organization, it pays to watch his health to make sure that he is not doing anything which will undermine his physical condition. This is one reason why many large firms encourage athletics and outdoor sports among executives, and also retain a practicing physician to look after the health of the employes.

Has He the Right Attitude?

One employer states that next to physical health his chief interest when interviewing a man is to find out his attitude of mind.

As an illustration:

Will this applicant be open-minded and accept suggestions, or, after he has been on the job for a while, will he be so set in his ways that it will be difficult to persuade him to make changes and improvements?

Is he the type that seeks continually to make improvements, or will he become satisfied and run along in a rut until someone jars him out of it?

Will he resent criticism, "fly off the handle," or feel injured in case it is necessary to correct his mistakes?

Is he willing to accept orders, executing them promptly and wholeheartedly, even when they do not agree with his own ideas?

What will be his attitude towards his job and his superiors after he thinks he has made good and there is little danger of losing his position?

Will he do more than his share and co-operate willingly with others under all circumstances?

This employer went on to say that his own time and peace of mind was so valuable that he could not afford to have around him an employe who did not have the right attitude towards his work.

Check Negative Qualities

Another executive has had some unfortunate experiences because he overlooked certain shortcomings of men selected, and now makes it a rule in considering applicants to endeavor to satisfy himself as to whether the latter have any of the qualities which he wishes to avoid. He wishes to know whether a man is inclined to be lazy, to try and slide out from under work, pushing it off on others. This fault of never doing any more than necessary is frequently coupled with procrastination. Those who procrastinate are almost hopeless. They drag behind, delay the work of others, and never seem able to clean things up or get work done on time.

He trys to avoid the type that continually hesitates and never seems to know just what to do. Sometimes this indecision is due to lack of knowledge, lack of courage, lack of self-confidence, or just plain inability to make up one's mind. Regardless of the reason, this executive has come to the conclusion that indecision and lack of prompt action is the cause of so much unsatisfactory work and delay that employes who are afflicted with this particular malady clog up the machinery of his organization to such an extent that their room is more valuable than their presence.

He also avoids the pessimist and those who find fault, criticize, and never seem quite satisfied. His chief aversion is for those who say, "It can't be done." He puts a premium on optimism and resourcefulness.

Self-Discipline and Self-Control

This man also states that he desires, if possible, only employes who have sufficient self-mastery and self-control to do the things that they know they should do. His experience has been that failures are not due so much to ignorance or lack of judgment as to the inability of employes to force themselves to do things that they should. The impulse or the desire to do something else frequently proves stronger than their will-power. The employer in question believes that the real basis of effectiveness is will-power and self-discipline, and that no man can be really effective in an executive position until he can force himself to do his work in the right way and to handle matters in the way that they should be handled, regardless of his personal feelings, emotions, or desires. His parting comment was, "Avoid the well-meaning, weak-willed individual who has insufficient strength of character to accomplish what he sets out to do."

Constructive Qualities

Of course, in hiring for minor positions one must not expect too much. Nevertheless, if there is any choice between applicants those with qualities which will prove valuable in later years should be selected.

First, we want assistants of judgment, courage, and resourcefulness, who can solve problems, handle trying and difficult situations, and accomplish sanely the tasks given them.

There is needed also vision and initiative, because, after all, those who are to assume responsibilities and accomplish things themselves must be able to plan for the future and pick out the essential things to be done. They must possess enough leadership to win the confidence of

subordinates, direct their efforts and get them to accomplish things.

Another thing is desirable: Organizing ability. Can the applicant visualize the work to be done, divide it into individual jobs, assign it to the right people, train them and exercise sufficient discipline and control to see that it is done as planned? Unless men have this characteristic so essential to the executive, they will fail when promoted to higher positions.

Other Qualifications

There are, of course, other qualifications to be taken into consideration in the selection of men, such as perseverance, personality, courtesy, and tact. A sense of humor is a valuable asset and helps a man over many trying situations. We should also satisfy ourselves as to a man's capacity for work, his ability to do things accurately and thoroughly, and his capacity for growth. Throughout our interview we should watch out for signs of insincerity and selfishness, as above all the executive must surround himself with loyalty and dependability. His whole future is in the hands of his assistants. They can make or break him.

Cannot Find Such a Man

In reading such a list of suggestions as is given above, the first thought is that no such individual exists—no one possesses all the good qualities mentioned above. True, everyone has his shortcomings. We can only expect to choose those who possess the desired qualities to a greater degree than others.

There is a certain advantage to that method of selection which is known as the process of elimination. Some employers find it easiest to set up negative qualities which they wish to avoid. Then from among the applicants not eliminated because of these negative qualities a choice is made, and the chances are that those selected will have to a certain degree the constructive and positive qualifications desired.

It is easy to give a list of the characteristics which are to be desired in employes, but the real problem is to learn how to judge individuals and be able to satisfy one's self regarding their characteristics. This comes only with practice and experience. While various tests and systems for judging people have been urged on employers from time to time, the writer does not believe that any of them are of much value to the average employer.

None of the manufacturers interviewed could tell exactly how they satisfied themselves regarding the points suggested, other than to say that they used their judgment and made inquiries regarding the employe's past experience. Unfortunately, references are not of much value unless one can talk personally to former employers, so that frequently we must depend entirely upon our own judgment.

A check list of the points to be noted while talking with applicants is helpful in forming conclusions systematically, and in advance of each interview one should make up his mind as to just what information will be necessary to satisfy him that the applicant has the desired qualities. While it would be possible to give here a list of methods used by various executives in forming their conclusions, yet since these would represent only individual experiences they could hardly serve as a criterion for others.

One executive pointed out during these discussions that there was a tendency on the part of some employers to think that when a man had been hired there was nothing more to be done than to tell him what his work was and then forget him until some mistake had to be corrected or until it was necessary to give new instructions. This executive states that he proceeds on the theory that the selection of a man is but the first step in fitting him into the organization, and that he makes it a practice to pay special attention for some months to a new employe until the man has become thoroughly familiar with the general policies of the company and the practices which it wishes followed in handling the company's business. If the new employe is lacking in general knowledge regarding the candy industry, a special effort is made to see that he acquires this information as rapidly as possible. Sometimes this is done by suggested readings, but more frequently by arranging to have the new man spend a certain amount of time with the heads of different departments, so that they may impart to him such general knowledge of the business as will be helpful.

Even after the new employe has proved himself satisfactory there remains the problem of giving him such work to do as will develop further the characteristics desired. Sometimes this is accomplished by giving more and more responsibility and adding to the duties which he already has, or by transferring from one type of work to another. Some employers have had considerable success by assigning to newer men special problems to be worked out, as the study and concentration necessary to grasp a problem and bring forth an answer is in itself excellent training.

There is considerable satisfaction in developing men. It becomes a fascinating study to take the raw recruit into the organization and gradually develop him from the immature and inexperienced employe into a well-rounded assistant with executive ability, whose judgment can be depended upon and whose initiative, resourcefulness, and loyalty will prove a permanent asset to the managing executive.

The statement which one manufacturer made at the close of a discussion on the characteristics to be most desired in an employe will serve excellently as a concluding paragraph for this subject. He said in effect: "And when you write this article just suggest to the proprietors and executives who read it that they take a few minutes off from their business and interview

themselves, checking up their own qualities against the qualities which they want to find in employes. It pays a man to take account of stock regarding himself, because the chances are that there is sufficient room in himself for improvement, so that he can afford to exercise a little discipline on himself in order that he may be more effective in the management of his own business."

Here Is Another Problem of Personnel

In the majority of plants the management practices and routine develop gradually. They are accepted as a matter of course by employes who frequently grow up with the system. Sooner or later, however, the proprietor finds that his systems are either too cumbersome or perhaps inadequate, and he is faced with the problem of changing over his methods in order to handle effectively his increasing business. Sometimes he brings in the outside expert, or perhaps there may be developed by some man in the organization a new system which he thinks will meet the situation.

It is at this point that a common mistake is frequently made. Those who are installing a new system become so absorbed in its advantages that they overlook the personal equation and fail to realize that any system, no matter how carefully planned, may prove to be a bewildering mass of red tape unless the right persons are selected to carry it on. If the personnel of the departments to which the system applies fail to grasp its underlying principles, or if they are not thoroughly sympathetic with its workings, they may not only fail to operate the system as planned but their clumsiness may bring the entire plan into disrepute. Instances can be cited where frequently good systems and methods have proved worse than useless, so that the executives of the moderate-sized plant should use considerable caution in installing a new system.

Since the human factor is so vital in the operation of any system, progress will be easier if the following rules are observed in making installations:

(a) The members of the organization should be "thoroughly sold" on the plan and its general principles. Their enthusiasm and interest are large factors in the successful operation of the plant.

(b) Every organization has its rate of assimilation, and, therefore, new ideas or changes from existing methods should not be made more rapidly than they can be "sold" to and absorbed by the members of the organization.

(c) So long as the general underlying principles are sound, it is more important that the control system be one which members of the organization like, than that it be perfect in every detail or conform to any hard and fast rules. Men get better results from a system which they like.

Make changes gradually, thus avoiding the confusion and misunderstanding which result where a system is changed over completely at one time.

It is unfortunate that in some instances those making installations of modern systems have failed to take in consideration the personnel of the organization and its attitude towards the system. Many have proceeded on the theory that it is more important for the system to be absolutely correct and that little attention need be paid to antagonism or opposition.

The first step is to "sell" the general idea to those affected. Do not discuss details until those interested are convinced of the soundness of the general plan. Once "sold" on the general principles, their co-operation is easily secured in perfecting the details. Where details are discussed first, those opposed have an easier opportunity to pick flaws in the plan and show why it will not operate.

The steps to be followed in determining the organization required to operate the system are the same that apply in the development of any organization. They are:

(a) Subdivide the work to be done into individual operations.

(b) Group and classify these operations, first, according to sequence and similarity.

(c) Estimate the amount of work involved under each classification, and determine the total amount of work involved in each division. This will indicate the number required to carry out the work.

In the smaller organization one man, with the assistance of a clerk, may be able to handle all of the work, while in the larger organizations there may be so much detail that many employes will be needed.

Who Shall Teach the Foreman

The sixth of a series of twelve articles on Foremanship

by J. K. Novins

INSTRUCTION of foremen is either by a paid instructor, hired by the company because of his technical knowledge of factory operation and experience in this kind of work, or by a member of the factory organization whose services are voluntary.

The choice of a competent instructor does not always rest with the management. More often, especially in the case of voluntary class leaders, if the choice does not rest entirely with the men, they are at least consulted on the matter by the management.

Strictly speaking, most foremen instructors are not "teachers." In most plants where group study classes have been organized, the teachers are designated as "class leaders" or "group leaders." Their duty is not to teach, but to help the foremen study for themselves. The leader is an organizer. He acts in the capacity of club chairman. By impressing his personality upon the men and exercising tact he can turn the group into an orderly study machine with all parts functioning. Otherwise there is danger that one or two foremen of more than average intelligence and the "gift of the gab" will monopolize the discussion at the expense of the other foremen. The leader must help the group steer a straight course. Many a group has hit the rocks for want of an efficient leader and because foremen began to lose interest before the course was half finished.

Picking the Instructor

In the larger plant where foremen training is a regular thing the management hires trained instructors. This is a more difficult matter than one imagines. In the case of the standardized study group planned by an outside organization, things are so arranged that the men can take care of themselves without the aid of a trained instructor. A leader has charge of the group. But in plants where courses have been shaped especially with reference to the needs of the plant, the material for study being drawn chiefly from the experiences of the plant, the instructor assumes more of the characteristics of the "teacher." He is expected to organize the classes, to plan the courses and to gather the material for use in the classes. As he is on hand to see that the foremen apply the knowledge to their jobs, he must make certain that his instruction is accurate and practical. Otherwise the foremen will lose faith in his teaching ability.

Teaching the green worker offers less difficulties as he is receptive to instruction, realizing it will help improve his position materially. The foreman, on the other hand, often resents some one talking down to him, except, of course, when that personage is the general superintendent or some one higher in authority. Professor MacDonald of Cincinnati University, who has had a great deal of experience in organizing foremen's meetings and training instructors, summarizes the situation in the following manner. He says whenever a group of foremen gather the individual members will show the following characteristics:

1. They have mature minds.
2. They are inclined to scoff at theory.
3. They have well established habits.
4. They are largely self-made men.
5. They are self-confident, of the "show-me" type.
6. They are not usually open-minded.
7. They have never carefully analyzed their jobs.
8. They are skeptical about training courses.
9. They think best when antagonized.
10. They enjoy discussing their every day problems.
11. They are jealous of authority.
12. They have a high regard for the square deal.
13. They may be expected to co-operate well if they have faith in the men in charge of any movement.

Requirements of Good Instruction

F. Theodore Struck, of the Pennsylvania State Department of Vocational Education, presented at a meeting of the National Safety Council what he considered were the five chief points on the requirements of good foreman instruction.

The first element, Mr. Struck pointed out, was the instructor's ability to do the job. This presupposed sufficient technical training to enable him to teach others. The second element was his ability to analyze the job with a view to properly presenting the salient features in his instruction to the men. He should then be able to arrange the instruction in good teaching order so that the student will realize the practical application of the theory. With that should

come the ability to impart the instruction effectively; and lastly, the ability to measure the results obtained.

In addition to a knowledge of the subject and the methods of its presentation, the instructor must be able to measure the individual capacities of the students. He must gauge this by the students' educational records, their working and home conditions, and their progress during the course of study.

Regularly employed instructors are allowed a great deal of free time. The factory management considers it a narrow policy to load the instructor's time with a lot of class duties, as they are expected to gather material for their courses in the plant proper. They collect actual problems from the experiences of the plant executives and the workmen. They must have plenty of opportunity to mix with the men to learn their viewpoints, and to find out what are the most pressing needs of the foremen. In one plant three instructors are employed, with a staff of assistants to follow up the work of the students. Most of the instructors' time is spent outside of classes—learning the production and administrative problems, gaining contact with the executives to determine weak co-operation by the foremen and to find out how they could and should be remedied, and in gaining actual contact with the foremen themselves to determine whether the instruction is being properly applied.

The Outside Instructor

When an outside instructor is hired the management takes pains to first put him through the factory for a reasonable period of time so he may become acquainted with the firm's policies and problems. He then becomes a valuable instructor, respected by the foremen. They share the benefit of his experiences in many plants, whereas the instructor taken from the organization is apt to be limited in his scope of understanding, judging applications solely upon the experience of that one firm. An ideal instructor is one who has studied the problems of a number of plants from first hand experience and contact and is trained to analyze his information with respect to definite applications. The necessity of acquainting the outside instructor with the workings of the plant was shown by the experience of one plant where the training course failed because the instructor did not have a first hand knowledge of the problems arising in the particular plant.

The case is easier analyzed than solved. There is an actual dearth of foremen instructors qualified by both experience and teaching ability to conduct a course properly. Modern industry has not yet developed the efficient foreman instructor, though there are plenty of good instructors to "break in" the green worker. Very few men are endowed with all the qualities requisite to the instruction of the experienced, hard-headed, practical, veteran factory foreman.

The Committee System

This problem is solved in some plants by resorting to the committee system. A committee is formed, consisting of the plant manager, a super-foreman, the employment manager and a good instructor. This committee is endowed with all the qualities of an all-round foreman instructor. It plans the course and supervises the instruction. And one of the men, usually the instructor, is called upon to execute the principles decided upon by the committee, or the members of the committee alternate as leaders, or the committee chooses an outside leader.

More often, especially at group meetings, the employment manager supervises. The employment manager is the logical person, as he is supposed to look after the interests of the men with a view to effecting greater co-operation with the management. In plants where the training is under the supervision of a regular vocational training department the supervisor of instruction often acts as leader of the group.

While desirable in many respects, it is not always advisable to have the employment manager, or the supervisor of instruction, act as class or group leader. In the presence of authority the men might not feel free to express their candid opinions and relate their true experiences, especially if these experiences should reflect on their efficiency. Every good instructor knows that the best way to reach the student is to first learn his deficiencies. If the foremen relate only their feats and pleasant experiences, most of which might be inconsequential, and deliberately hide their management difficulties, the group meeting begins to lack sincerity and the students lose interest.

Foremen Select Own Leader

Where leaders are not selected by the management the groups select their own leaders from among other executives, or elect one of their number to that capacity. A new development is for the group to elect by secret ballot some foreman to act as group leader. This leader is then instructed on his duties, the employment manager entrusts him with the solemn duty of carrying out the program faithfully. He is usually a clever fellow who plays no favorites and is keen on lining up his men for "action." He is a good fellow, a born cheer leader. He usually has before him an outline of the discussions for the period. One topic at a time is taken up, and the men discuss it in the light of their experiences in the plant. With a little training and experience the leader becomes an adapt in the work.

Where the employment manager, superintendent or other factory executive supervises the group conference he takes care not to run the discussions. He remains in the background, preferring to give the men full play. Very often he precedes the conference with a brief talk, which never lasts more than fifteen minutes, or at most a half hour.

Atmospheric Spoilage of Candy

by Thomas M. Rector

Consulting Chemist

What Is Atmospheric Spoilage?

FOR the purpose of this discussion we may define atmospheric spoilage of candy as spoilage directly or indirectly due to the chemical or physical action of the atmosphere. Chemical action usually results in oxidation changes, such as rancidity of fats and other minor changes which are very little understood. Physical changes include evaporation of flavoring oils, drying out and hardening caused by evaporation of water and stickiness, softening, and other changes due to absorption of water from the air.

All of these changes are of comparatively little moment to the small manufacturer who confines his efforts to a limited locality, but are of extremely great importance to the manufacturer who is striving for wide distribution of his products. Means for preventing these changes or restraining them for long periods are therefore of the greatest interest to manufacturers of the latter class.

Oxidation Rancidity

The term "rancidity" is usually applied to a change in the composition of animal and vegetable oils and fats which result in the development of a peculiarly disagreeable odor and taste. Obviously the candies which suffer from this form of spoilage are those containing fats and oils. These include caramels, fudges, nut candies, chocolates and others. The chocolates may be considered in a class by themselves on account of the peculiar nature of cocoa butter. Oxygen, however, plays a part in the loss of quality of chocolate candies with age although the flavor developed by stale chocolate does not resemble the typical "rancid" odor of other fats.

The tendency for candies containing fat to become rancid depends on the way in which the fat is combined with the other constituents, the time of storage and the temperature of storage. The amount of fat in the candy is of secondary importance. A piece of candy of which the surface is covered with a film of oil or butter fat is much more likely to become disagreeably rancid than a piece in which the oil is thoroughly dispersed, each small globule being covered with an envelope of sugar mixture.

If candy has free exposure to air, and this is usually the case, rancidity development may be considered as being directly proportional to the time of storage, other conditions being the same. Fortunately the sense of taste is not able to distinguish rancidity in its early stages for undoubtedly candy which is subject to rancidity starts getting rancid the minute it is made and exposed to air.

The temperature of storage has a great deal to do with the development of rancidity. Being a chemical reaction, rancidity is subject to the general chemical law which states that the speed of a chemical reaction doubles for each 10° Centigrade or 18° Fahrenheit rise in the temperature. This simply means that it will take about twice as long for a product to become rancid at 60° F. as at 78° F. This fact alone justifies cold storage for many kinds of candies.

Evaporation of Flavoring Oils

Spoilage due to loss of flavor may be considered as an atmospheric change for the reason that flavors which evaporate are carried away by the air and lost. If air is not allowed free access to the products loss of flavor by evaporation is extremely small. If candy is packed in a container, the walls of which are not penetrated by the flavor, the free space within the container is soon saturated with evaporated flavor and further evaporation thereby prevented.

In hard candies and other candies of very firm composition, evaporation of flavor takes place only from a thin surface layer. In candies of a crystalline nature, like fondant, a liquid film surrounds the crystals and may act as a medium for transferring flavor from the interior of the piece to the surface, from which it can freely evaporate.

Evaporation of Water

Much of the difficulty from staleness and hardening of candies with age, is due to evaporation of water. The conditions which favor evaporation of water are in general the same as those which lead to loss of flavoring oils. Flavoring oils, however, may evaporate into moist air with as much ease as into dry air. This is of course not true of water. For a certain kind of candy containing water, there is always a humidity equilibrium point at which the candy neither absorbs or gives off water. Below this point evaporation takes place, the rate increasing as the air becomes dryer. In winter in a heated store the humidity is very low and drying takes place with corresponding rapidity. In summer trouble from absorption of water is likely to occur.

Stickiness, Graining and Softening Caused by Absorption of Water

Substances which absorb water from the air are said to be deliquescent or hygroscopic. Of the substances used in candy making cane sugar, glucose and invert sugar are all hygroscopic

under conditions of extreme humidity. Invert sugar, whether added to the candy as such or developed during boiling, is by far the most hygroscopic of the three. Under conditions of extremely high humidity and air temperature, such as prevail in the tropics a comparatively low percentage of invert sugar is actually enough to cause the candy to liquefy. In candies containing acids the absorption of water starts a vicious circle of spoilage. Water absorption causes inversion of sugar and inversion of sugar leads to the absorption of more water.

Besides stickiness and softening, "graining" or crystallization can also be blamed upon absorption of atmospheric moisture. Candies subject to graining may be described, in the language of the physicist, as super-cooled, solid solutions. In other words the sugars are boiled down until far stronger than crystallizing strength and then cooled under conditions which do not allow crystallization. The presence of a very little water absorbed from the air gives the sugar molecules enough freedom to arrange themselves in the form of crystals. This condition spreads throughout the piece until it is entirely "grained."

Protective Candy Containers

THE conditions discussed are all so familiar to every manufacturing confectioner that they hardly merit description. The matter of protective means for preventing these forms of spoilage may be of more interest.

In the confectionery plant, adverse air conditions can always be solved by proper air conditioning equipment which simply means adjustment of humidity and temperature. Air conditioning has been particularly successful in candy and chocolate plants and has solved to a great extent the production problem but, unfortunately, the manufacturer cannot also control the destructive atmospheric condition in which his goods are stocked and displayed before reaching the consumer, therefore, this selling problem is a very vital one of far reacting effect. This problem has prompted some exhaustive research work on containers which will relieve this situation.

A great deal of work has been done with the objective of producing a paper container which would serve as a protection against excessive humidity, at least. Some success has been achieved, particularly with hard candies, but the difficulties in the way are many and hard to solve. No matter how carefully paper is made and prepared there are always holes through which moisture from the air may come in or moisture from the candy go out. Of course, with a paper container, there is no hope of keeping out the oxygen of the air. Its only utility lies in preventing rapid change of air. In spite of the many faults that can be found, however, well-made waxed and other "water proofed" papers have the merit of being comparatively cheap and are found very useful where they are not required to cope with extreme conditions.

Another type of container which is finding increasing use is the glass jar provided with a screw-top, clamp or similar easy opening device. The friction-plug or slip-over tin can is in the same class. These containers are quite efficient as protection against humidity and evaporation damage but none of them may be considered entirely safe. The writer has seen hard candies which had been sent to the tropics packed in friction-top tin cans returned in an almost liquid condition. This was undoubtedly due to the continued breathing of the tin with changes of temperature, each day bringing at least one change of air.

While containers of this class offer greater protection than those made of paper the manufacturer cannot always rely on them to take his product to the consumer in perfect condition and this is, of course, what he wants. We must therefore go one step further and take up the hermetically sealed container. This type of container may be obtained either in glass or tin and of course offers complete protection against damage due to change of air. This means that the hermetically sealed container may be relied upon to prevent practically all losses due to evaporation of flavoring oils and moisture and as well as spoilages due to absorption of moisture from the air. Prevention of chemical oxidation, rancidity, etc., is a matter which depends, not only on the changes of air in the container, but largely on the amount of air left in the container after sealing. Obviously, hermetic sealing is the only method of packing which allows control of the amount and composition of the gases occupying the free space in a container. Where the product is subject to damage by oxidation, it is of course desirable to eliminate as much air as possible from the container. With this end in view two methods of packing have been developed, both applicable to glass and tin containers. These are the methods of packing in a partial vacuum and the newer one of packing in an atmosphere of inert gas. The former method has found its greatest application in connection with glass containers though tin cans are sealed under a vacuum to a limited extent. A fundamental handicap to vacuum, however, has been the fact that each square inch of surface of the container must withstand pressures of from five to twelve pounds per square inch and such pressures are very likely to cause leakage of air through the closure. This difficulty has been overcome more successfully in the case of glass containers than those made of tin.

In the gas packing method, the air is first removed to the greatest possible extent by means of a vacuum pump and the vacuum immediately filled with a chemically inert gas, usually either

(*Continued on page* 41)

The Manufacture of Gums

The third article in an extensive series on technical and practical subjects pertaining to the production of confectionery.

by George J. Shaler

PRACTICALLY every variety of candy sold today had its origin in a similar piece made years ago and changed only as new raw materials or machines were developed. To all intents and purposes a gum drop is simply an unbeaten marshmallow, or more properly, a marshmallow is a gum drop beaten up with some colloid (gelatine for example).

When the marshmallow makers deserted gum arabic and albumen in favor of gelatine the American gum makers changed from gum arabic to starch. In England they were a little more consistent in adopting gelatine for their gum making, and many of their gums are still made in this way. Some old fashioned gums are sold and some mention will be made of the method of their manufacture, however, their entire output might be withdrawn from the market without appreciable loss in the country's gum sales.

In referring to gums this article will deal strictly with gum arabic and starch gums (A. B. Gums) leaving fruit gelatine, agar jellies and starch pastes for the future.

In formula for old fashioned gums the gum referred to is presupposed to be gum arabic (Accacia) and the grade generally in use is known as light sorts. This is entirely satisfactory unless a perfectly white piece is desired, in which case a higher grade—white tears—should be employed. There are, however, other gums which may be used to advantage if price is an inducement. Upper river Senegal or Aden work well, in fact, many gum makers recommend them in pieces where it is desirable to incorporate some corn syrup. Either one may be used half and half with gum arabic.

The Process of Manufacture

The process of manufacture is substantially the same for all gums of this type. The gum and about an equal weight of water are placed in a water jacketed kettle and the gum is allowed to dissolve at boiling temperature. The steam is then shut off and the solution allowed to cool and stand for about twelve hours. At the end of this time a crust will have formed on the top which, when removed, will carry with it the bulk of impurities and dirt from the solution. The gum is now ready and the sugar or sugar and glucose called for in the formula may be added.

From this point on the method of cooking differs in different factories. Some recommend that the mass be allowed to simmer slowly for as long as twelve hours, while others (the greater number) require the cooking be completed in from an hour and a half to two hours. The cook is completed when the batch falls from a spatula in wide ribbons. The amount of water added to the gum is dependent on the length of time the batch is to cook. It should never be allowed to more than simmer.

Color, flavor and deposit in starch, then place in the dry room until one drop when cooled is of the desired texture. It is impossible to give a definite time for this as it will vary with the size of the piece and with the efficiency of the room.

Remove from the starch, dust clean. Allow to dry then place warm in a revolving pan, preferably made of wood, with a small amount of petroleum jelly and run until covered. Stand in the open room for twenty-four hours then pack.

This type of drop is made in all forms from the hard brittle "druggists' gum" to an almost liquid centered piece which must be crystallized to make it salable. Formula will be given for each kind at the end of this article.

Starch Gum

With the wider possibilities made obtainable through the improvement and standardization of starches and corn syrup came the present starch gum. There is nothing against this class of confection in itself but there is much to be said against its abuse by those who think only of price competition. The original gum drop was far from a cheap piece and a well made starch gum today must command a fair price but the possibility of cheapening it and the necessity of large production to maintain the manufacturing departments have led to the marketing of goods which have thrown the whole line into ill repute. To the average consumer a

gum drop is the last word in plebeianism. They are in a way justified in this feeling by the course which the manufacturers have followed. Hard candy went through the same mill when the vacuum pan was first introduced and made possible a line of goods carrying 60 to 80 per cent of corn syrup. It is only within the last five or six years that it has come into its own again. Let us hope by the application of "quality" that the old stand-by *gum drops* will be revived in popular favor.

Types of Starches

The base which is depended on for the jelly body of gums is, of course, starch and without a certain familiarity with this staple the maker cannot proceed intelligently. Starch is the carbohydrate constituent of all grains and the source from which it is produced for commercial use is dependent on the grain crop predominating in the country in which it is made. In the United States the most ready and economical source is maize, and while we can procure the starch segregated from rice, wheat, potatoes, tapioca and several other raw materials of vegetable origin we turn to corn starch for the bulk of our needs. This is largely because we need starches with different specific qualities for different types of work and corn starch is the only one refined in various forms in America.

There is no need for a description of the first steps in starch refinement. From that point where the pure starch is obtained in suspension in water its ultimate form is dictated. Some of the starch liquor is run to the converters where it is hydrolized and after filtration and concentration emerges as glucose or corn syrup. Another portion may be neutralized, dried, ground and produce moulding starch, or it may be dried in lump form and sold as heavy boiling or pearl starch.

Thin Boiling or Crystal Starch

The form most in demand by candy makers for cooking is the thin boiling or crystal starch. This starch is treated with acid and then dried slowly. The acid treatment makes it more readily soluble and while the gravity or thickness of the boiled solution is optional with the maker it is usually sold in a far lower gravity than the heavy boiling varities. For work which is to be dried in a dry room the thin boiling acid starches are to be preferred, but for pastes and undried jellies the heavy boiling gives better results. It is particularly desirable for short goods if the alkalinity is fairly high.

In making up formulas it must be born in mind that when boiled with acid the nature of the starch is changed and that in this way it may ultimately be converted into corn syrup.

Size of Batch

There has been a tendency on the part of the manufacturers to constantly increase the size of their gum batches. There is little to be said in favor of this practice. If the resulting paste is to be cast quickly into large moulds or if the plant is so laid out that several depositing units are fed from one kettle the result of cooking in large batches will be satisfactory, even better, as a rule than goods cooked in smaller lots as the tendency to hurry the cooking is largely done away with. If, on the other hand, small drops or jelly bean centers are to be made, or one depositor must do all the work, it is next to impossible to produce a uniform product. If the last of the batch is to be any softer than glass the first must be under done and will either fall in if sufficiently dried or sweat if taken from the dry room in time to prevent this. Time consumed in cooking is an important item in any class of candy but is probably more important in gum work than any other.

Amount of Water in Batch

The last sentence is an introduction to the importance of water in a starch gum formula. For various very obvious reasons it is impossible to dictate the exact amount any manufacturer is to use in a given sized batch unless all the conditions surrounding and bearing on his individual problem are known. The steam pressure, the shape of the kettle, the freedom with which the steam escapes are all controlling factors. Hoods used over kettles to carry away the steam are often so constructed as to condense the steam and allow the water to flow back into the batch. As a general rule it is safe to assume that the cooking should not be completed in less than two hours and should not take longer than two and a quarter hours. With the normal type gum kettle, forty pounds of steam and a five hundred pound batch, it is safe to cook a trial batch using one gallon of water to each pound of thin boiling starch. If the cooking is accomplished too quickly or the finished goods are at all cloudy this quantity must be increased. From time to time during the cooking examine a sample of the boiling batch and if it is not clearing up add more water at once. It is far safer and better to boil out too much water than to finish the cooking having employed too little.

In working with starch it is necessary that a large quantity of water be used and that the mixture be complete. In other types of confections the principal duty of the water is to get the sugar in complete solution and this being accomplished the more quickly it is removed the better. In starch cooking, however, the requirement is different. It is necessary, if the consistency of the finished goods is to remain unchanged by time, that every microscopic starch grain be fully expanded by water absorption. This condition is arrived at by prolonged exposure to boiling water. In completely expanded starch grains produce a cloudy appearance in the finished drop and by continuing to absorb moisture either dry out the goods or make it "cheesy" in texture. In either case the goods if crystallized will blister and peal.

Amount of Sugar and Corn Syrup

In making up a formula any desired proportion of sugar and corn syrup may be specified but there will be grave danger of graining if the sucrose or granulated sugar content exceeds 40 per cent of the combination. Gums made in this proportion may not be sweet or tender enough to suit the higher class trade and in that event any reasonable proportion of the corn syrup may be replaced by an invert sugar of standard quality. If this is done, however, the proportion of starch should be slightly increased as the invert sugar contains no dextrin which as a gum, present in corn syrup, adds to the body of the goods.

The foregoing statement may seem in direct contradiction to the proportions given but is none the less true. Presupposing the use of thin boiling starch it is customary to base the starch content on the proportion of corn syrup to sugar. If all corn syrup is used then approximately 12 to 14 per cent of starch will be necessary and this figure may be reduced as the sugar content increases until it reaches 10 per cent. Nothing less than 10 per cent is sufficient.

Difference in Starches

Even when you have arrived at a perfect combination with one shipment of starch there is no special reason to believe that this proportion will continue to give satisfaction with the next. Starch varies from batch to batch. Not nearly as much today as it did years ago but still it varies and every new lot *should be tried out before the old lot is exhausted.* If the trial batch of drops is too soft add more of the new starch to each batch. If they are too tough reduce it a little.

There is also the danger of a low acidity in the starch which may result in the gum not clearing up with the accustomed handling. Watch the new trial batch and if it is still cloudy when you are accustomed to seeing it clear add a little more water. If this fails add citric or tartaric acid in small quantities until it does clear. Add the acid an ounce at a time and give it five minutes between additions in which to do its work. Keep careful track of how much is added in all and then when you begin to run on that particular lot of starch add the required acid all at once. Never resort to the acid treatment unless necessary for it adds to the expense of manufacture, and aside from removing the cloud by increasing the solubility of the starch certainly does not help the batch any.

Mixing the Batch

There are two different ways prescribed for putting a gum batch together but if sufficient water is used there seems little difference in the results. All cooks put the starch in suspension in *cold* water being very careful to break up all lumps. From this point their methods differ. Some put the syrup, sugar and starch liquor all in the kettle together and bring to a boil. Others put in the styrup, sugar and part of the water; bring this to a boil then add the starch liquor slowly. To the writer it seems a matter of "take your choice" although there is a theoretical danger of the starch precipitating out of a cold solution if not constantly stirred. With a less readily soluble starch than thin boiling and an inadequate stirrer, conditions which were at one time universal, this was doubtless a very real danger.

Time of Cook

The goods should be cooked with not more than 40 lbs. of steam and that in limited quantity if color is an object. The gum is very apt to scorch near the completion of the cook and even a little of this will give a yellow color to the entire batch.

When the gum falls from a stirring paddle in broad ribbons with pendular drops which break loose allowing the ribbons to spring back, it is done. Some cooks examine the edges of these ribbons where they leave the stick and if they wrinkle, consider the cooking complete.

Flavoring and Coloring

The flavoring and coloring are far from the least important features of the manufacture but are not often intelligently done. The color gives less trouble than the flavor but still deserves some consideration. Allow the boiling to completely stop and the first heat to leave the batch before either color or flavor are added. Select your color with due consideration of the fact that the mass to be colored is already slightly yellow. If you want green in the finished drop have the coloring solution or paste somewhat on the blue side, etc. When the goods are removed from the dry room they will have diminished in weight about 10 per cent. This generally means that the color will brighten or, more correctly, deepen in equal ratio.

After the goods are colored flavor them. The common practice of pouring the oil or extract, as the case may be, direct on the top of the hot batch and depending on the stirrer to carry it through is all wrong. A very considerable part is distilled off before it has a chance to penetrate the mass. As you approach your factory from the side away from the wind you know just what batch your cook is making at the moment. You could get the information about what batch your cook is making in far cheaper form than that of smelling distilled lemon oil in the vicinity. The flavor should be mixed with some material which will carry it down into the center of the batch at once and distribute it there. A scoop full of granulated sugar does well or if there is any danger of graining the batch in this way use a smaller quantity of powdered starch. Try the first batch you flavor in this way and determine how much you wish to reduce the quantity of oil used.

Depositing

Little need be said of the depositing. The hopper should be hot and, of course, the starch should be *clean.* Tailings in gum starch are as

undesirable as in any other. A clear impression or a well finished piece are impossible if the starch is sticky and contains foreign matter.

Drying

The importance of drying cannot be overestimated. Many manufacturers completely confuse drying with baking or steaming. They believe that if the goods are sufficiently heated nothing further is needed. Water cannot be evaporated from gums exposed to a saturated atmosphere. It is absolutely necessary that the air in a dry room be constantly changed. The writer has often had this statement challenged by manufacturers who claimed and believed that their dry rooms were operating successfully without ventilation. A careful inspection showed that there were plenty of cracks and openings which chanced to be so placed that they produced a regular circulation and, of course, the work was aided every time the door was opened. When these conditions are true to the point where real efficiency is obtained the little god of luck plays his part too.

Gums should remain in the dry room until all free moisture, that is, moisture not held in suspension by the starch, is dried out. The general way employed by gum makers to determine this is to take one piece out and break it in half. If the raw surface does not stick to the back of the hand when pressed gently against it the drying is considered complete. This is all right if the hand is perfectly dry and reasonably free of starch. In fact the writer knows of no better way which does not require a laboratory.

Crystallize

If the goods are to be crystallized particular care should be exercised in cleaning off the moulding starch. It is not sufficient to brush them in the mogul. They should be either washed or steamed. Immediately after this process they must be sugar rolled. Drops should never be removed from the starch and then be allowed to lie around for hours before they are sugared. When they first leave the starch and are cleaned the surface is soft and if the sugar is immediately applied it is pressed in and holds firmly. A few hours' exposure to the air will cause the formation of a leathery coat to which the sugar grains adhere only by the adhesive strength of sugar syrup. After a time the sucrose in this syrup crystallizes and the sugar grains fall off leaving bald spots.

The material used to stick the sugar fast varies in practice with the factory. Various combinations of sugar, water, and corn syrup and gums are employed but the most satisfactory seems to be residue crystal syrup.

After sugar rolling the drops should be allowed to dry for a day or so before being crystallized. They should be warm when the crystal is applied.

Statements relating to drying made in this article doubtless sound ambiguous and indefinite. It is impossible that they should be otherwise as there is no standard of drying facilities on which to base figures. In this respect it is a case of every man for himself. The systems of drying are many but provided the water is removed from the gum in a reasonable time and at a reasonable price and the drops are not case hardened the writer is disinclined to quarrel with any of them.

Formulae

The following formula are suggestions that may be altered to suit the class of trade catered to and the price desired. Provided the sugar content is not excessive and the proportion of starch is maintained any combination will work. In plants where many gums are made there is usually a considerable quantity of syrup left over from their crystallization. Gums cooked from this are fully equal if not superior to those prepared from granulated sugar. In order that the crystal may always be bright and the gums clear colored it is strongly suggested that the syrup be used only once in the crystallizing process.

Formula No. 1

Hard Gum Arabic Gums

125 lbs. Gum Arabic (White Sorts)
160 lbs. Water

Dissolve the gum then allow to stand not less than 8 hours. Skim, then strain.

Formula No. 2

95 lbs. Sugar (granulated)
30 lbs. Sugar (invert)
2 gal. Water

Cook to 290° F. then add gum batch, mix thoroughly and allow to simmer until ready to cast. Should take only few minutes.

Formula No. 3

Gum Arabic Gums with C. S. U.

85 lbs. Granulated Sugar
25 lbs. C. S. U.
2 gal. Water

Cook to 300° F. then add gum batch prepared as follows:

75 lbs. Gum Arabic
50 lbs. Senegal or Aden
130 lbs. Water

Prepared as above described.
Mix, simmer and cast.

Formula No. 4

Hard Gums (Slow Cook)

65 lbs. Gum Arabic
45 lbs. Sugar
10 lbs. C. S. U.
1 qt. Glycerine

Dissolve the gum as above with 90 lbs. water.

Cook sugar and C. S. U. to 280° F. and when slightly cooled stir slowly into the gum mixture. Add the glycerine slowly then allow the batch to set all night in a warm room. In the morning skim, then bring to a boil and allow to simmer

(*Continued on page* 41)

To encourage export, we have had prepared by one of the leading exporters, a report on the sales possibilities of American confectionery in various countries of the world, all the data having been gathered from first hand authentic sources.

These reports will be published monthly for the purpose of creating a wider interest in foreign markets for confectionery.

Specific information regarding individual products or reports on special countries in advance of regular publication may be obtained gratis upon request.—EDITOR.

A Survey of the Confectionery Market in PERU

Peru is bounded on the north by Ecuador, on the east by Brazil and Bolivia, on the south by Bolivia and Chile, and on the west by the Pacific Ocean. The coast line is about 1,400 miles in length, including sinuosities, and the population is about 4,500,000. The inhabitants are chiefly mestizos or cholos—that is, mixed Spanish and Indian. The Indians themselves form a large percentage of the population. There is a considerable number of Europeans and "criollos," the latter being descendants of European immigrants. There are also some Chinese.

It is difficult to divide the seasons, for in certain sections there is no rainfall, while in others, such as the Amazon River district, rains are most frequent throughout the year, with but slight changes in temperature. The chief factors are the trade winds from the Atlantic and the difference in altitude. The climate from 3000 to 9000 feet altitude is temperate and healthful. While the seasons are marked, they are the opposite of those in the United States. The hottest months are January and February, temperature ranging from 82° to 86° F.

The national language is Spanish. Among the Indian population, however, there are many native dialects, the Quichua being the most common. The libra (Lp) or Peruvian pound, equivalent to 1 pound sterling or $4.8665, is the unit of value. It is divided into 10 (s/) soles and 1 sol equals 100 centavos.

Peru imports large quantities of confectionery, only small quantities of same, however, coming from the United States. Confectionery is also imported from Great Britain, Italy, France, Germany, Belgium, Hongkong, Spain, Brazil, Chile, etc.

The Confectionery Market in Peru

The local industry is a thriving one. Local confectionery may be produced cheaply because labor is cheap and the source of supplies is at hand. About 80 per cent of the imports from the United States consists of hard candies in tins of various sizes, packed in this manner to withstand severe climate changes, while the balance consists of fancy chocolates.

At this time there does not seem to be much of a demand for American confectionery, the English and Swiss goods predominating in this market. The local industries merely manufacture the cheaper grades of candies, which are used by the poorer class of the population.

The Peruvian buyers of confectionery prefer a box with fancy covers or designs, or a box that can be used after its contents are disposed of. Practically all of the boxes seen on this market are of this type. Confectionery also is packed in round tins of ½, 1 and 2 pound sizes.

The packing required should be such as would protect the contents from the effects of a moist climate, as during the winter months the climate in the western portion of Peru is very damp. While the climate of Peru is not strictly tropical, still the method of packing for tropical countries would undoubtedly best suit this country.

Packing cases should be strong and well strapped in order to prevent damage from rough handling and pilferage. The containers used by exporters in other countries are generally the sealed tins and pasteboard boxes, with suitable linings to protect the contents from moisture, etc.

Goods are generally sold in Peru by American firms on terms of cash against documents, although in some instances longer credits are given. This is especially true of European exporters of this class of goods, and it may be well to state that this is an important factor in the sale of merchandise to Peruvian buyers if the exporters in the United States wish to compete with European concerns. The prices at which chocolates are sold are from S/-3.50 to S/-3.80 per pound regardless of the size of the package, but fancy packages are priced as high as Lp.1.0.00 per pound (equal to $4.10 U. S. Currency).

The present tariff on confectionery is 25 centavos per kilo (2.2 pounds) gross weight, which includes case, packing and contents. Besides the net tariff there are surcharges amounting to 19 per cent additional.

There is a trade-mark fee of Lp.2.0.00 for registering trade-marks of foreign concerns and the requirements for registration are, application to the office of the Ministro de Fomento (Minister of the Interior), setting forth the trade-mark, etc., and then publication in a newspaper designated by that office for a specified length of time, after which the trade-mark is registered.

Practically the only method of advertising in the

Peruvian market is through the medium of the newspapers, the principal newspapers suitable for advertising in Lima being: "El Comercio," "La Prensa," "El Tiempo," which are daily and Sunday papers printed in Spanish, and "The West Coast Leader," a weekly paper printed in English.

The market for confectionery in Peru is rather staple, the consumption being comparatively large. Competition is keen, but the American brands, handled by experienced importers here who have the force and reputation to sustain an energetic advertising campaign should become the most important factor in this market.

An exclusive representation should be given to a reliable firm in this country. Care should be exercised in selecting foreign agents, and a thorough investigation as to the business integrity and financial standing of foreign companies should be conducted through the commercial reporting organizations.

The imports from the United States for the fiscal years ending June 30th were: 1912, $5093.00; 1913, $8404.00; 1914, $6198.00; 1915, $6656.00; 1916, $13,876.00; 1917, $27,564.00. For the calendar years 1918, 1919, 1920, 1921, the imports were respectively $20,854.00, $86,324.00, $205,555.00, $36,450.00.

Growth of the Confectionery Export Trade

Confectionery exported from the United States in 1923 was valued at $2,013,944, compared with $1,282,928 in 1913. This increased export, together with the numerous inquiries received by this department from the confectionery trade, would indicate a growing interest in foreign markets. The United Kingdom is the best market at the present time for confectionery products, while Canada is a good customer. Certain countries of Latin America, with Cuba and Panama in the lead, are heavy purchasers of American sweets.

Porto Rico as a Market for Confectionery

Porto Rico is an excellent market for practically all kinds of confectionery from the United States. In 1923 the United States shipped 4,578,703 pounds of confectionery to the islands, valued at $728,294. Candy is sold in all of the small corner stores handling miscellaneous supplies, in all of the drug stores, tobacco shops, and small provision stores, but there are practically no large candy shops as we have them in the United States. Hard candies are the best sellers throughout the country districts, but there is a good market for all higher grades of candy, especially chocolates, in the large cities, and among the American population. Unless a company is prepared to send a special representative to the territory to make a personal visit to the firms, the best method of obtaining sales is through an agency in one of the large cities—San Juan or Ponce. The deterioration of chocolate is one of the greatest problems in Porto Rico, so that very large orders are not usual, but small orders frequently shipped are better. Packing must be carefully observed, individual containers should be air-tight, preferably of tin and the candy must be of consistency to prevent melting. A lining of wax would be advisable within the container, and individual pieces of candy may be wrapped in tinfoil for further protection.

The candy maker is dealing every day with the application of chemical principles although he may not be conscious of this fact.—*H. S. Paine.*

Terms Customarily Granted by Exporters

IN shipping confectionery to foreign countries, American exporters prefer to grant terms net cash, allowing no discount, this cash basis being felt necessary due to the perishable nature of the product dealt with. Some exporters invariably receive cash from the customer, agent or sales representative for goods before they leave the United States, or upon sight draft, documents attached. Other firms, if the foreign buyer has satisfactory credit standing with them, draw at 60 days sight, documents attached, or if the foreign buyer has not credit standing with them, but is known to be a responsible firm, draw at sight, documents on payment.

In South America, merchants ask for very long terms of credit—sight 60 to 90 days or even longer. Terms vary according to the financial standing of the customer, but it is usual to grant to South American customers who are satisfactory credit risks, terms of 90 days from date of shipment, shipments being made with documents attached to 90 days' draft from date of shipment.

In the countries of Central America and the islands of the West Indies to well rated and reliable firms terms are granted of 30 days' sight draft, documents attached for acceptance or a cash discount of 2 per cent if paid on presentation. In selling the Mexican trade, terms of 2 per cent discount for 30 days or 60 days net are extended, making shipments in open account, where the credit standing is satisfactory.

A great deal of the foreign shipping of confectionery is done through large commission houses in New York City, which buy and sell to foreign merchants and are in a better position to handle the accounts than the merchants in the confectionery industry who cannot afford to grant the long credit terms required in some instances.

Market for American Confectionery in Venezuela

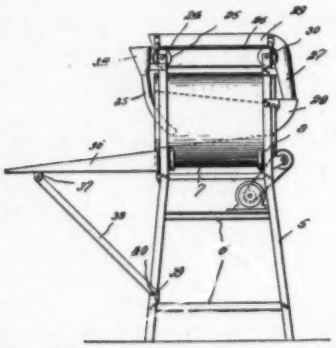
According to a report from the American Consul at Caracas to the Department of Commerce, the market for confectionery in Venezuela while not large is steady and nearly one-half of that imported comes from the United States. The imports consist mainly of various grades of chocolate, although some hard candies are on the market. Considerable confectionery is manufactured by local factories and in the homes from brown sugar and native fruits, and these confections are sold very cheaply by street vendors to the poorer classes. Imported confectionery is consumed only by the richer classes. Sales are made by weight rather than in packages and the better retail stores carry fancy containers to be filled by the customers. The trade is not large enough to warrant an exclusive agency, and traveling salesmen visiting the trade now and then would be a better method of selling than by establishing a local representative or agency. Due to the very warm climate and the humid atmosphere, candy deteriorates very rapidly so that great care must be given to packing and large stocks should not be held on hand. Advertising goods is not very profitable and would not bring results. Credit terms vary from 30 to 120 days, but 90 days is customary. It is important that customs declarations be correct in every detail, and before shipment the Venezuelan customs and tariff schedule should be given careful study, giving attention to the fact that duties are different for identical merchandise packed in various types of containers.

Responsibilities gravitate to the person who can shoulder them, and power flows to the man who knows how.—*Elbert Hubbard.*

WHAT'S NEW?

New Patents

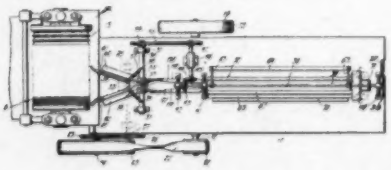
1,497,126. Confectionery Apparatus. Wendell W. Stead, Rochester, N. Y. Filed Sept. 8, 1923. Serial No. 661,715. 3 Claims. (Cl. 91—7.)



SAME SIZE ZINC OF ILLUSTRATION ONLY

1. In a confectionery apparatus of the class described, a supporting frame, a drum-shaped receptacle supported for rotation within the upper end of said frame and being formed at its opposite ends with different sized openings, a conical-shaped screen fitted at its opposite ends within said openings, means for rotating said receptacle, means for delivering a supply of powdered material to the front end of said screen, and means for delivering a supply of doughnuts or the like to the rear end of said screen.

1,496,880. Candy-Making Machine. John T. Hohberger, Chicago, Ill. Filed Oct. 26, 1921. Serial No. 510,539. 7 Claims. (Cl. 107—4.)



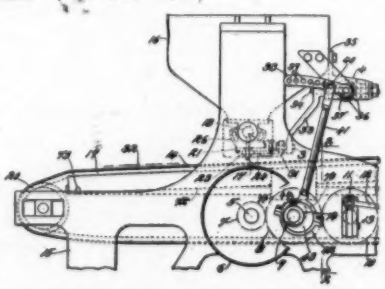
1. A machine of the character described comprising a plurality of cutting and forming rolls, one of said cutting rolls being movable toward and away from said other rolls, and means for rotating said rolls comprising a drive shaft, spiral gearing between said rolls and said shaft, said gearing comprising a spiral gear on one end of said movable roll and a wide faced spiral gear on said drive shaft meshing therewith.

2. A machine of the character described comprising a table, candy cutting means mounted above said table, said means comprising a shaft, shears mounted to rotate with said shaft in synchronism with the movement of said belt, a conveyor belt mounted to move along the upper surface of said table, means for forming and cutting said candy into pieces comprising a plurality of flanged rolls and means for moving said candy off said belt to feed the same to said rolls.

5. A machine of the character described comprising a table, candy cutting means mounted above said table, a conveyor belt mounted to move along the upper surface of said table, means for forming and cutting said candy into pieces comprising a plurality of flanged rolls, said table being provided with a slot extending parallel to said belt, a guide extending from said slot to said rolls, and means for moving said candy laterally off said belt and into said slot, whereupon said candy moves by gravity to said rolls.

7. A machine of the character described comprising a table, candy cutting means mounted above said table, said means comprising a pair of shears rotating about an axis transverse to said belt, and means for providing a bend in said belt to accommodate said shears as it moves into cutting position adjacent said belt, said means comprising rollers above and below said belt to deflect the same from its normal path of movement.

1,498,546. Candy-Making Machine. Robert S. Hislop, Racine, Wis., assignor to Racine Confectioners Machinery Company, Racine, Wis., a Corporation of Wisconsin. Filed June 5, 1922. Serial No. 565,916. 8 Claims. (Cl. 107—28.)



1. In a machine of the character described, the combination with a depositor for plastic material, and a receiver for the material deposited, of means for relatively turning said depositor and receiver to twist said material as it is deposited, said means having provision for varying the extent of such turning movement.

8. In a machine of the character described, in combination, a container for plastic material, a valve casing below said container and communicating therewith, a valve device in said casing, a plate having a hooked flange provided with notches, said casing having a shoulder engaged by said hooked flange, fastening devices engaging said notches for detachably securing said flange to said casing, a nozzle rotatably mounted in said plate and communicating with said casing, a pinion carried by said nozzle, a rack bar co-operating with said pinion, guides having a flange for supporting said rack bar and a second flange engaging the flange on said plate, and means for reciprocating said rack bar.

The Manufacture of Gums

(*Continued from page* 37)

until done. This should take about two hours. *Never boil.*

The following formula are for starch gums in ascending quality. Water is omitted for reasons given in the early paragraphs.

Formula No. 5
Straight A. B. Gums
450 lbs. 43° C. S. U.
65 to 70 lbs. thin boiling Starch
Cook all together.

Formula No. 6
A. B. 20 per cent Sugar
350 C. S. U. 43°
100 Sugar
50 to 55 thin boiling Starch
Cook all together.

Formula No. 7
A. B. 36 per cent Sugar
270 C. S. U. 43°
180 Sugar
50 to 55 thin boiling Starch.
Cook all together.

Formula No. 8
A. B. with Nulomoline
180 lbs. Sugar
90 lbs. Nulomoline
180 lbs. C. S. U. 43°
55 to 57 lbs. thin boiling Starch
Bring batch to boil then add starch and finish.

Will Standardize to Prevent Waste

The campaign conducted by the Chamber of Commerce of the United States against wasteful variety in manufactured articles is actively afoot in nearly two score industries which turn out everything from coffins to carpet tacks. Not only have the manufacturers among themselves taken up the movement generally, but very real progress has been made in recent conferences at the Commerce Department.

Standardization of woolen and worsted cloth in weight, shade and yardage in bolt also has been under consideration, and makers of metal lathe, wood, tin or glass containers, blankets, steel lockers, sash and door millwork, and range boilers have begun to explore the possibilities of reducing the variety of their output and thus reducing cost and prices.

Food Manufacturers Confronted by Problem of Location

Food manufacturing plants located in the outskirts of New York City are facing the problem of excessive labor turnover, says a recent report of the Committee on Regional Plan of New York and its Environs.

Heretofore such a statement would have elicited a certain amount of resigned comment to the effect that industrial workers must be trained to realize the advantages of the rural districts; today we are beginning to realize, as pointed out by a recent issue of the Journal of Commerce, that factory workers engaged in eight hours of monotonous toil demand and should have opportunity for pleasant relaxation during the noon hour.

Here is still another field for constructive endeavor. —*American Food Journal.*

Atmospheric Spoilage of Candy

(*Continued from page* 33.)

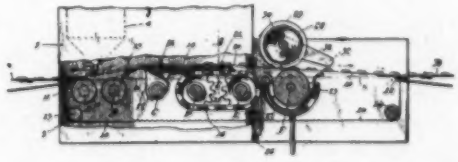
nitrogen or carbon dioxide. Nitrogen is, of course, the inert constituent of the air. Carbon dioxide is ordinary soda-fountain gas and is non-poisonous and harmless in every respect. When the vacuum in the container has been replaced with gas the pressures within and without are equalized and there is therefore very little tendency for the gas to escape.

While hermetically sealed containers, with or without the vacuum or gas processes offer the best protection for candies now available, this protection is of little avail unless the container is attractive in appearance and easy to open. The difficulty of making containers with perfect closures which would fill the other specifications has undoubtedly held back the development of this type of candy containers. Within the past few years, however, easy opening vacuum glass containers have appeared on the market and await the use of the enterprising manufacturer. The larger can companies have also been very active in improving opening devices for really hermetically sealed containers. Beautifully lithographed tin cans which can be hermetically sealed and readily opened by the consumer are now available. These cans are so made that the covers are replaceable after opening and for this reason with their handsome appearance are highly desirable because of their "utility" value, or secondary use by the consumer.

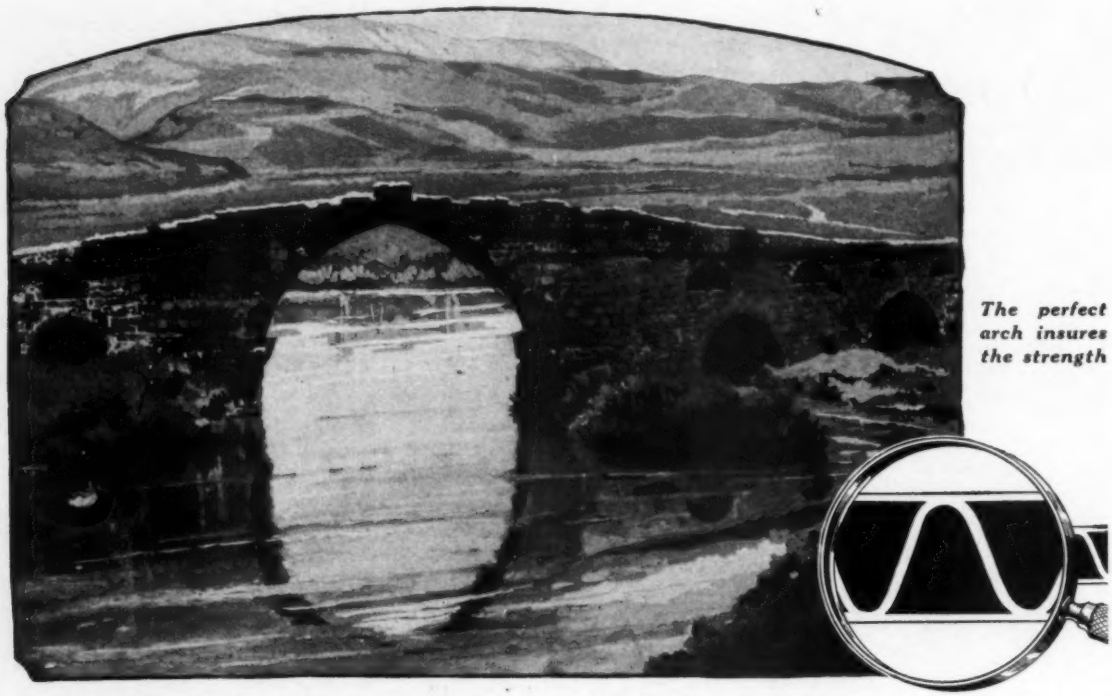
These facts should set the enterprising manufacturer to thinking of the possibility of widening the distribution of his products by packing in hermetically sealed containers. National distribution of fine caramels, fudges and other candies which have heretofore been considered perishable are well within the realm of possibility.

New Patents

1,499,347. Bottomer for Candy-Coating Machines. James Conte, Bloomington, Ill. Filed Feb. 27, 1922. Serial No. 539,597. 8 Claims. (Cl. 91—2.)



1. The combination with an enrobing apparatus having a coating discharge nozzle and a reticulated conveyor movable past said nozzle, of an elevating frame comprising rails disposed longitudinally of said conveyor upon which said conveyor travels after leaving said nozzle, devices for vibrating said frame whereby said conveyor is agitated to remove the surplus coating from the articles thereon, a transverse cylinder below and supporting said conveyor after the latter leaves said frame, means for supplying said cylinder with a film of coating and devices for maintaining said conveyor in contact with said cylinder while passing the latter.



The perfect arch insures the strength

This slight, rudely built foot-bridge in Palestine is still serviceable although twenty centuries of time have passed over it—a wonderful example of the resistance of the arch.

The Mid-West Box is Strengthened by the Arch in the same way as a Bridge

For 2000 years countless feet of men and beasts and millions of tons of various burdens have been carried safely over this bridge whose sole claim to strength lies in its supporting arch.

Whether in bridge or corrugated fibre board shipping package, like the popular and widely used Mid-West Box, the function of the arch is the same—to protect, to support, to brace, to absorb weights, pressures and shocks, and to insure safety.

THREE DISTINCTIVE MID-WEST FEATURES

Waterproof Container: Is everything its name implies.

Triple Tape Corners: Stop tapes from splitting and peeling.

Offset Score: Insures tight closing contact of end flap.

The high arched corrugations of the Mid-West Box save 30% to 70% of smashage costs with ordinary boxes, making this box the logical shipping package for thousands of commodities. It is built up to a quality, not down to a price. And as the higher priced suit of wool will outlive the cheap suit of shoddy —so the Mid-West Box can not be placed in comparison with low-priced, nondescript boxes that do not "deliver the goods." Mid-West Boxes conform to every railroad requirement including **highest test liners**—the guarantee of a better, more economical service that you cannot afford to ignore.

The increasing use of Mid-West Boxes in your field is entirely due to their filling a need—BETTER.

A card will bring an expert to check over your problems. Write today. No obligations.

Our "Perfect Package" Data Sheet is free on request

MID-WEST BOX COMPANY

GENERAL OFFICES
18TH FLOOR CONWAY BLDG.,
CHICAGO, ILL.

Corrugated Fibre Board Products

MID-WEST

FACTORIES
ANDERSON, INDIANA
KOKOMO, INDIANA
CHICAGO
CLEVELAND, OHIO
FAIRMONT, W. VA.

Reducing Losses in Candy Shipments

by Mr. J. D. Shields

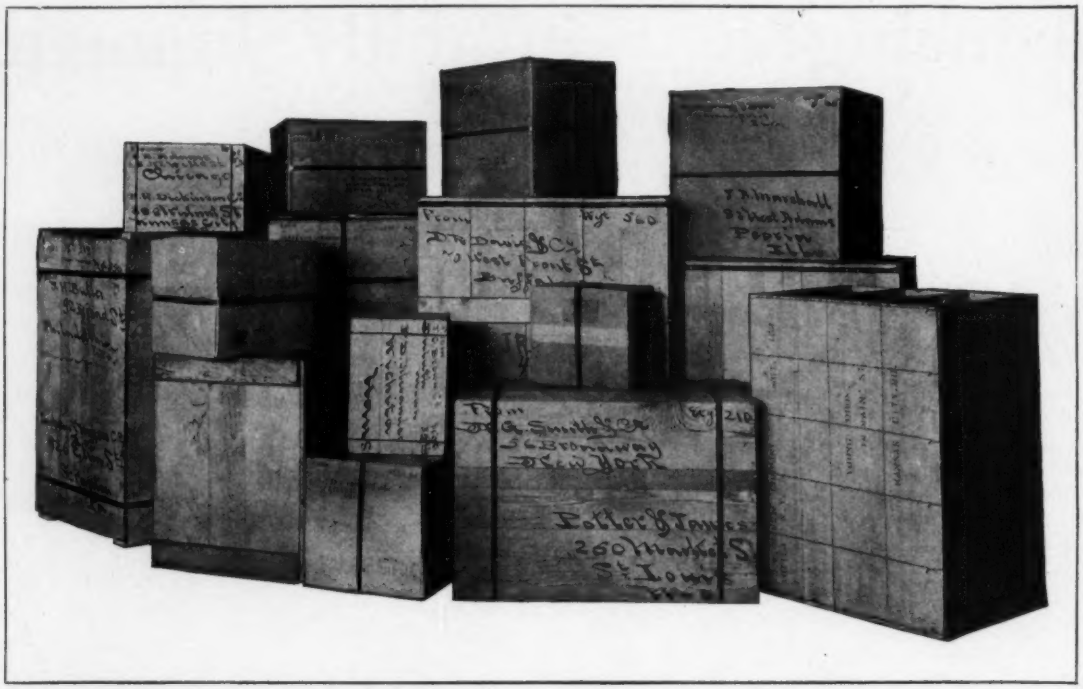
Member of Committee of Freight Claim Prevention, American Railway Association and Freight Claim Agent, C. B. & Q. R. R. Co.

WHAT would a policy be worth to a jobber which would insure the arrival at destination in O. K. condition of every package shipped? Not an ordinary policy that would merely indemnify him in case of damage or loss, but a scheme that would prevent loss or damage, would assure the shipper that he would experience no more claim annoyances, complaints, losses or dissatisfied customers because of container failures. That something of this nature, were it possible, would be of distinct service to the commerce of the nation is evidenced by the fact that during the year 1923 millions of packages of freight were recoopered by the railroads while in transit. The causes of this great number of packages reaching cooperage shops ranged all the way from flaps not glued down on fibre containers and not enough nails in wooden boxes to the total collapse of the container. The cost of repairing and rebuilding these inadequate containers imposed a tax of several million dollars on freight transportation. This expense, of course, was additional to what was paid by the carriers in settlement of claims for loss and damage to the contents.

This almost inconceivable number of container failures in a year, in which it was generally admitted that the carriers handled freight more efficiently than ever before, suggests that a very prolific source of economic waste has to a large extent been overlooked. One often wonders if the container question in connection with the transportation of freight is given the serious consideration that it merits either by traffic managers of shippers or by claim prevention officers of railroads. It is not the purpose of this article to enter into a discussion of containers, but there are some points which should be kept in mind. First of all, the shipping container constitutes an enormous expense to the commerce of the country. It has been estimated by competent authority that shippers in the United States expend five hundred million dollars annually for shipping containers. Government statistics show that 16 per cent of the annual lumber cut is utilized for boxing and crating purposes. In some cases the expense of packing and crating or boxing a commodity for shipment exceeds the value of the commodity itself. In view of these facts, one would have hesitancy in recommending more costly containers even though the records of railroad freight repair shops do indicate that stronger containers are highly desirable. On the other hand, United States Forest Products Laboratory, whose studies and researches have done so much to standardize and improve containers, is positive that the use of inadequate and improper shipping containers is costing American business an enormous figure daily and one of the largest organizations of shippers in the country has estimated that one-half of the amount paid by railroads in settlement of concealed damage and unlocated damage claims is chargeable to poor packing and inefficient packing cases. Investigations by the United States Forest Products Laboratory have also brought forth the statement that the majority of failures in ordinary boxes are due to insufficient nails or improper nailing.

From such statements as these, it would seem that the container problem resolves itself into a question of strengthening the shipping container without appreciably increasing its cost. Without question, this can be done more readily and effectively by the steel wiring or strapping of shipping container than in any other way. The experience of large shippers who have strapped packages for a considerable period of time and our own observations are agreed that the steel strapped package is seldom broken in transit. Packages which might otherwise be found in a cooperage shop are usually delivered in O. K. condition to the consignee when properly strapped. The use of this device has invariably been followed by a decrease in such claims as are due to damage, concealed loss and robbery and a corresponding increase in the number of satisfied customers. Steel strapping comes nearer fulfilling the suggestion of a means of insuring arrival of a shipment without exceptions than anything we could suggest. It also takes care of the insufficient nailing problem referred to by the Forest Products Laboratory; it protects the package from the effects of the steady weaving motion of the freight car, a force which is unavoidable and destructive unless the container is adequate. It strengthens a box and reduces the possibility of its collapse. To the best of our knowledge, it is the cheapest transportation insurance that the shipper can buy.

Among the principal causes of loss and damage to freight is robbery. We are all familiar with the great increase in robbery in all parts of the country. In the past few years, no industry has escaped. The closely guarded bank, the United States mails and even the United States mint have yielded their toll to the thief. Naturally, the railroads have been great suf-



NOTE.—The above photograph is intended to show some of the types of reinforced containers now in use. It is not claimed that it shows all of these types, and it is not an endorsement of any claim for relative efficiency of competitive packages or binding methods. The railroads welcome any good and acceptable reinforcement and believe that the efficient methods will succeed on their merits.

ferers in this epidemic of lawlessness. In the transportation of freight railroads have had to contend with the professional thief with his sawed-off shotgun and high-powered car. This professional has no more regard for car seals or devices for the protection of freight than he has for the laws of the land or the rights of mankind. It is not to be expected that strapping a package would prevent his operations; strapping will, however, prevent the thief, who is morally weak and cannot resist temptation, the type that would not think of breaking and entering, but who finds it almost impossible to resist loose change or to pass a broken box without reaching in and extracting a handful of the contents.

The railroads are putting forth unusual efforts at this time to handle freight with the lowest possible minimum of loss and damage. Their efforts are meeting with success to a large degree. The co-operation given by the shippers is highly gratifying.

A feature that should not be overlooked is the increased loss and damage hazard brought about, strange as it may sound, by improved transportation methods; speed in freight houses, larger engines, bigger box cars, more intensive loading, longer trains and faster schedules. All of which tend to increase damage to freight in transportation, as compared with former years, and to render the satisfactory container of some time ago inadequate for today's use, unless strengthened to withstand the additional strain to which it must necessarily be subjected. Steel strapping will meet these requirements.

Reducing Pilferage Losses 65%

A 100 percent increase in the use of box strapping is an important factor in the reduction of 65 percent in claims for pilferage of merchandise in the last two years.

Amounting to five million dollars in 1923, these claims were nine million dollars less than for 1921, and there was also a substantial decrease in ordinary damage to merchandise due in part to the greater number of strap reinforced containers in general use.

The inspection bureaus and prevention departments had a big part in this improvement by inducing shippers of high grade merchandise to adopt box strapping. The good work is going on, but it is believed that new interest can be aroused, and an impetus given to the efforts to increase the use of strap by means of a special drive in which the wire and strap manufacturers will cooperate with special advertising.

The day of big slashes in the claim account has probably gone by. From now on successful prevention will be more of a persevering effort, with considerable attention to detail. One of the most fertile fields for effecting further savings, and providing more satisfactory service, lies in the direction of CONTAINER PROTECTION against damage and pilferage.

—(Bulletin) American Railway Association.